

GUIDE
TO THE
BRITISH MYCETOZOA

EXHIBITED IN THE
DEPARTMENT OF BOTANY
BRITISH MUSEUM (NATURAL HISTORY)

THIRD EDITION, REVISED

LONDON :
PRINTED BY ORDER OF THE TRUSTEES OF
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1909

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PREFACE TO FIRST EDITION

THE collection of British Mycetozoa, and the series of coloured drawings explaining their structure, exhibited in the Botanical Gallery, have been presented by Mr. Arthur Lister, the author of this Guide. All known British Mycetozoa are described briefly, and it is hoped that this account will serve as an introduction to the systematic study of the group.

In preparing his *Monograph of the Mycetozoa*, based on the collection in the British Museum, Mr. Lister generously enriched the National Herbarium by the gift of numerous specimens which had the special value of having been named after comparison with type specimens in the herbaria of the Royal Gardens, Kew; the Botanic Gardens, Edinburgh, Strassburg, Paris, Christiania, Leyden; the collections of Messrs. Phillips and Massee, in this country, and with specimens furnished by Dr. Rex, Prof. Farlow of Harvard University, Prof. Macbride of the State University of Iowa, and Mr. Morgan of Ohio.

For the purpose of ready microscopic examination Mr. Lister also prepared and presented to the Trustees eight hundred and thirty-two mounted slides, illustrating the British Museum collection of Mycetozoa, and they are preserved in a cabinet in the Cryptogamic Herbarium for consultation by students.

The present Guide is based on the study of this valuable material, and in its preparation Mr. Lister has had the advantage of the diligent assistance of his daughter, Miss Gulielma Lister, who has also made the coloured drawings exhibited in the case.

GEORGE MURRAY.

NOTE TO SECOND EDITION

THE present edition has been revised throughout by the author, and numerous additions have been made, thus bringing the work up to the standard of our present knowledge of the British Mycetozoa.

April, 1905.

NOTE TO THIRD EDITION

OWING to Mr. Arthur Lister's regretted death last July, the slight revision necessary for the present edition has been undertaken by Miss Gulielma Lister, who was intimately associated with her father in his work on the Mycetozoa.

Species and varieties not mentioned in the British Museum Catalogue are followed by references to the place of publication.

A. B. RENDLE.

DEPARTMENT OF BOTANY.

January, 1909.

BRITISH MYCETOZOA

INTRODUCTION

THE Mycetozoa are a group of organisms which may be placed in the border-land between the Animal and Vegetable Kingdoms. They are characterised by the constant sequence of three main stages in their life-history, viz. :—

1. The firm-walled spore gives birth to a *swarm-cell*, which soon acquires a flagellum.
2. The swarm-cells coalesce to form a wandering *plasmodium*.
3. The plasmodium ultimately concentrates to form either *sporangia*, enclosing numerous spores (Endosporeæ), or *sporophores*, bearing spores on their outer surface (Exosporeæ).

Many species are quite common, and are found on old decaying stumps and fallen branches in moist woods and shaded gardens; others inhabit heaps of old straw and dead leaves which have lain undisturbed and become soaked with rain. The stage in which they are most conspicuous is that of the sporangia, when they appear as minute objects, some roundish, about the size of small mustard seeds, others rising in clusters of brown columns on black hair-like stalks, while many take other characteristic forms. The different species display great variety and beauty in the colours they assume, ranging from pure white, golden yellow, bright crimson, and iridescent violet to dark purple and black.

The various phases in the life-history of the group may be described as follows :—

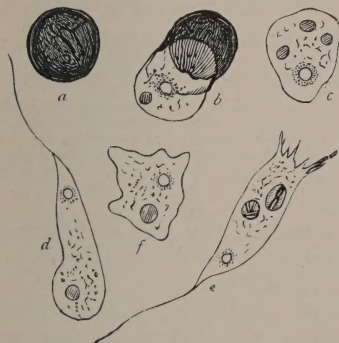


Fig. 1.—*DIDYMIUM DIFFORME* Duby.

- a. Spore.
- b. Swarm-cell escaping from the spore-case.
- c. Newly hatched swarm-cell containing a nucleus and three vacuoles.
- d. Flagellated swarm-cell.
- e. Swarm-cell, with two vacuoles containing bacteria, and produced at the posterior end into pseudopodia, to one of which a bacterium is attached.
- f. Amœboid swarm-cell.

Magnified 720 times.

Swarm-cells. After a period of immersion in water the swarm-cells emerge from the spores as amœboid bodies (Fig. 1); they soon acquire a flagellum at the anterior end, and creep in a linear form with the flagellum extended in advance, or swim in the surrounding water with a dancing motion occasioned by the lashing movement of the flagellum. They possess a single *nucleus* placed immediately behind and connected with the flagellum, and a *contractile vacuole*. To a large extent the swarm-cells feed on bacteria, which are caught by *pseudopodia* projected from the posterior end of the body. The bacteria are conveyed into the body-substance,

where they are digested in vacuoles which form round them; there may be one or more digestive vacuoles, each containing several bacteria at one time. The swarm-cells rapidly increase in number by bipartition. When this takes place the flagellum is first withdrawn, and the swarm-cell assumes a globular form; it then elongates, and a constriction occurs at right angles to the long axis. Meanwhile the nucleus is passing through the process of division by karyokinesis, and in the course of a few minutes the halves of the nuclear plate separate and retreat to the opposite ends of the constricted cell, which now divides into two; each segment soon acquires a flagellum, and resumes the former active state.

Microcysts. In all cultivations of germinating spores a number of the swarm-cells, after a short time of activity, become encysted in a globular form as *microcysts*. In this state they may remain dry.

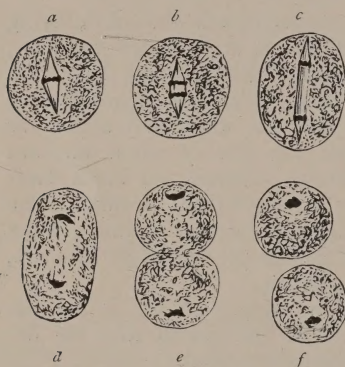


Fig. 2.—*AMAUROCHÆTE ATRA* Rost.

a to *f*. Successive stages in bipartition of swarm-cell, accompanied by the division of the nucleus by karyokinesis. Magnified 1200 times.

Drawn from stained preparations in Canada balsam.

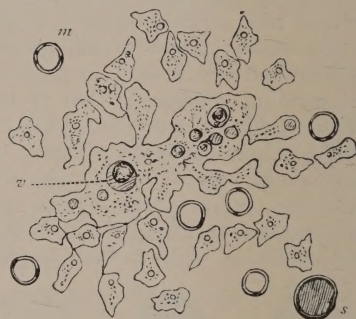


Fig. 3.—*DIDYMIUM DIFFORME* Duby.

Young plasmodium, with attendant amœboid swarm-cells, some of which have turned into microcysts (*m*); one microcyst is being digested in a vacuole (*v*). An empty spore-shell is shown at *s*. Magnified 470 times.

for several days, but on water being added the cyst-wall is ruptured and the contents creep out and assume again the motile condition. Frequently the entire group of swarm-cells will change to microcysts, and reawaken in the course of two or three days while still immersed in water. A few days after the germination of the spores, the process of bipartition, by which the number of the swarm-cells has greatly increased, ceases. The majority now withdraw the flagellum, and adopt true amœboid movements.

Plasmodium. These amœboid bodies collect in clusters, and coalesce to form *plasmodia*, which may be described as masses of naked protoplasm abounding in nuclei and more or less coloured granules. The nuclei at this early stage appear to be those of the individual swarm-cells which have fused together. Careful

investigations lead to the conclusion that the vast multiplication of nuclei which takes place during the growth of the plasmodium results from simple division. Apparently one instance only of division by karyokinesis in this stage of the plasmodium has been recorded, and of this observation permanent preparations are preserved (Fig. 5). As the plasmodium increases in bulk by the ingestion of nutritive matter and by the union of small plasmodia, it acquires the remarkable streaming movement peculiar to itself. In the majority of species the plasmodium is white, but there are many in which it is yellow, and in some it is greenish, pink or purple. It penetrates the substance of dead wood or spreads over the surface of dead leaves, bark, etc., in a network of veins, taking a somewhat fan-shaped outline; through these veins the more fluid matter in the interior streams constantly in a rhythmic flow. The current

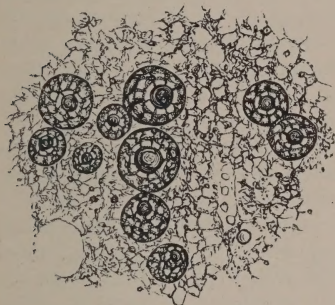


Fig. 4.—*BADHAMIA UTRICULARIS* Berk.

Group of nuclei from actively feeding plasmodium that covered two pilei of *Auricularia* in fourteen hours, showing the irregular size of the nuclei and large nucleoli.

Stained in picro-carmin and mounted in Canada balsam. Magnified 1200 times.

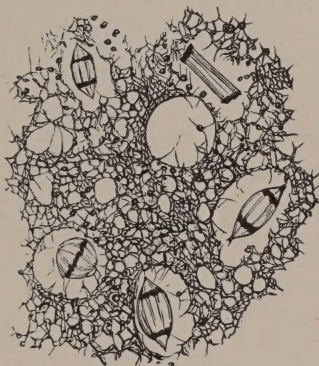


Fig. 5.—*BADHAMIA UTRICULARIS* Berk.

Division of nuclei by karyokinesis in the streaming plasmodium. Magnified 1200 times.

From a preparation stained in safranin, and mounted in Canada balsam.

continues in one direction for a certain period, usually a minute and a half, when it stops, and after a moment's pause reverses its course, flowing the opposite way for about the same length of time, but rather longer in the direction in which the mass is advancing. It is by this means that the plasmodium creeps forward. The object of this onward movement appears to be a search for food. The yellow plasmodium of *Badhamia utricularis* feeds on woody fungi; if cultivated on *Stereum hirsutum* on a plate and covered with a glass shade, it extends itself over the fungus with a turgid advancing border until it has devoured the more delicate hyphæ. Having exhausted the nutriment, it will spread over the plate and the interior of the glass shade. If it is in sufficient quantity, it will in the course of a few days cover the glass with a network of veins over an area of perhaps forty or fifty square inches.

A piece of fresh *Stercum*, soaked in water, may now be inserted beneath the shade, allowing it to come in contact with one of the smallest veins. In a few hours the whole of the plasmodium will have withdrawn from the sides of the shade, and concentrated itself on the fresh food in a dense yellow mass. The length of time during which the plasmodium will continue to feed and increase in bulk before changing into sporangia differs according to the species, and also to the conditions of its surroundings. *Physarum psittacinum*, which inhabits the rotten stumps of old trees, appears to pass twelve months in the plasmodium stage; on the other hand, *Didymium difforme* will go through the several stages from germination of the spores to the formation of the sporangia in a fortnight. The latter species is very common, and may easily be cultivated. The spores can be sown in water on a thin cover-slip supported over a glass slide by a ring of wet blotting-paper, and the required nutriment supplied by two or three slices of the mucilaginous coat of a garden-cress seed, in which bacteria rapidly develop: in this moist chamber the whole process of the division of the swarm cells, their coalescence to form the plasmodium, and the construction of the sporangia, may be watched under the microscope.

Sclerotium. The plasmodium, if allowed to dry, passes into the *sclerotium* or resting stage. The sclerotium of *Badhamia utricularis* is dull orange-red in colour, of horny consistence, and made up of a multitude of thin-walled cysts closely packed together; each cyst is filled with granular protoplasm, among which ten to twenty nuclei are interspersed. On being wetted the sclerotium will revive in the course of a few hours and resume the streaming movement. Preserved in a dry state, it will retain its vitality for three or four years, but it is longer in reviving according to the length of time it has remained in the resting condition.

Sporangium and Spore-formation. The formation of the sporangium may be illustrated by the growth of *Comatricha obtusata*, a common species which is often found on the under side of fir planks that have been left to rot on the ground. When the fruiting period arrives, the watery-white plasmodium issues from the wood at a point favourable to the development of the sporangia, and spreads over an area measuring perhaps half an inch across. After a time the plasmodium is seen to concentrate in thirty or forty centres, and in an hour or two each centre has risen into a pear-shaped body with a narrow base, a dark stalk being just apparent through the translucent white substance. In six hours the black hair-like stalk has grown to its full length, and bears at its summit the young sporangium, which consists of a white globule of viscid plasma with a diameter about one-fifth of the length of the stalk. A pink flush now begins to pervade the sporangium, caused by the formation of the dark flexuose branching threads of the *capillitium* (referred to afterwards). The nuclei in the plasma still present the same appearance as those observed in the streaming plasmodium; in about another hour they show the beginning of

karyokinetic division (Fig. 6); as the process advances the plasma becomes separated in masses of two spores' capacity (Fig. 7); an hour later and karyokinesis is completed, and the final division into spores takes place. As the dark spore-walls are produced the colour of the sporangia rapidly changes, and in about twenty hours after the first concentration of the plasmodium they have matured and present the appearance of a cluster of minute black pins, with round or oblong heads, standing in regular order on the wood.

The sporangia of different species take various forms such as are represented by the woodcuts illustrating the different genera with numerous modifications. They may be either symmetrical or irregular in shape, and with or without a stalk; when sessile and of irregular form, as shown in Fig. 13, they have received the name

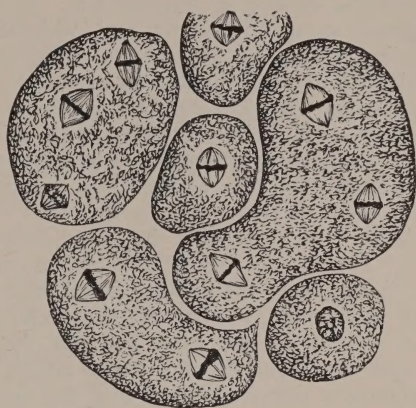


Fig. 6.—*COMATRICHA OBTUSATA* Preuss.

of *plasmodiocarps*. When many sporangia are combined, and their separating walls are imperfectly developed, the cluster is called an *æthaliu*m.

As the sporangia are formed, a membranous or calcareous residuum or *hypothallus* is often secreted by the plasmodium, and persists as a base on which the sporangia are seated.

In most genera a *Capillitium*, consisting of a system of threads, is found; this is constructed before the spores are formed, and in many species extends

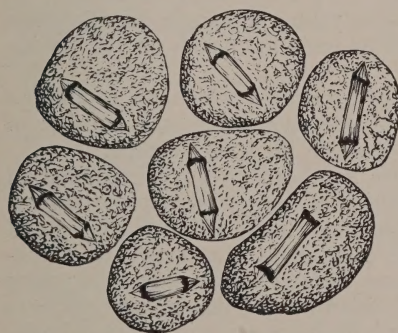


Fig. 7.—*COMATRICHA OBTUSATA* Preuss.

from the base of the sporangium, or from an extension of the stalk within the sporangium (the *columella*), to the enclosing wall. It

from the base of the sporangium, or from an extension of the stalk within the sporangium (the *columella*), to the enclosing wall. It

often appears to form a scaffolding, which prevents the shrinking inwards of the sporangium-wall in drying, and thus allows the spores to mature freely and without pressure. The capillitium differs widely in structure in different genera, and is beautifully adapted to assist in the dispersion of the spores on their reaching maturity. In *Trichia* the capillitium-threads lie free among the spores, and, being provided with spirally thickened bands which are strongly hygroscopic, twist and writhe with every change of moisture; by this action they separate the spores, so that they are easily carried away by the wind; such free threads are called *elaters*. In *Stemonitis* the capillitium springs from the columella, and extends to the surface of the sporangium, where it forms an enclosing net; the delicate membrane covering the meshes shrivels up on ripening, so that the spores lie in an open-work basket, and are blown by the wind through the openings. In *Arcyria* the capillitium consists of a dense tangle of branching threads, which, when the ripe fruit dries and the delicate sporangium-wall breaks up, expands to many times the original volume, and in so doing scatters the spores on all sides.

Calcium carbonate is usually abundant in the form of granules in the plasmodium and young sporangia of the species comprised in the subcohort *Calcarineæ*. In most genera of the order *Physaraceæ* these granules are withdrawn before the spores are formed, and are deposited partly in the sporangium-wall, and partly in vesicular expansions of the capillitium. These expansions take various shapes; they are globose, fusiform, or branched, and are sometimes fused together in the centre of the sporangium, forming a *pseudo-columella*. In the descriptions of the species they are termed *lime-knots*. In the *Didymiaceæ* the granules in the young sporangia are dissolved at a certain stage, and the salt forms again in crystals on the outside of the wall.

The genus *Cribraria* is one of several in which no capillitium is present, but the upper part of the sporangium-wall consists of an open net through the meshes of which the spores escape.

It may be well to repeat what has been already stated, that in the subclass *Endosporaceæ* the formation of spores takes place several hours after the sporangia have assumed their ultimate shape, and is immediately preceded by the division of the nuclei by karyokinesis, when each daughter-nucleus becomes the centre of a young spore. Here, as in the case of bipartition of the swarm-cells, true cell-formation takes place, and in both instances it is associated with karyokinetic division of the nucleus, whereas during the growth of the plasmodium the rule appears to be that the nuclei increase in number by simple division.

The subclass *Exosporaceæ* is represented by the single genus *Ceratiomyxa*, and is characterised by the numerous white spores being borne on the outside of columnar or branching sporophores. These are delicate fragile structures, often covering two or three

square inches of the dead wood on which they grow. The surface of the sporophore is mapped out into polyhedral areolæ, each containing a nucleus. From the centre of each areola arises a slender stalk bearing a single ellipsoid spore into which the nucleus passes. According to Dr. Jahn's recent observations the nucleus then twice divides by karyokinesis. On placing a ripe spore with its four nuclei in water the membranous wall at once slips off, and the naked contents lie for several hours, retaining their ellipsoid form. A constriction then takes place at right angles to the long axis, and usually before division is completed a second constriction of each half occurs; each of the four lobes contains, as Dr. Jahn has shown, a nucleus which again divides by karyokinesis; by a further constriction of the lobes eight globular bodies are formed which exhibit slow amœboid movement; each of these bodies now produces a flagellum, and the cluster swims away by aid of the lashing flagella. In a short time the swarm-cells separate, and behave, so far as their history has been traced, in the same manner as those of the *Endosporeæ*. The colourless plasmodium inhabits the substance of rotten wood, and exhibits rhythmic streaming with the same intervals of time between the forward and backward flow as in the larger subclass of the group.

The Mycetozoa are remarkably cosmopolitan, and have been found with identically the same characters in Europe, India, Japan, the Cape of Good Hope, Australia, New Zealand, North and South America and the West Indies.

There are at the present time about 214 species represented in the British Museum Collection; of these 146 have been recorded as British.

The colour of the spores in the descriptions is given as they appear under a magnifying power of 600 diameters. The sculpture of the spore-wall is described as magnified 1200 diameters.

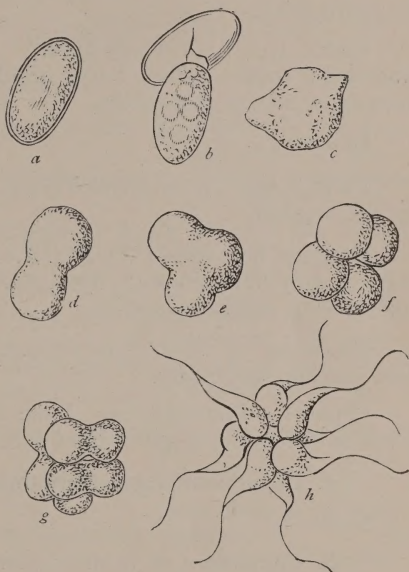


Fig. 8.—*CERATIOMYXA MUCIDA* Schroet.

a. Spore.

b. Spore-contents, showing four nuclei, escaping from the spore-wall.

c to g. Successive stages in the division of the naked spore into eight.

h. Cluster of eight swarm-cells.

Magnified 1200 times.

SYNOPSIS OF THE ORDERS AND GENERA OF THE BRITISH MYCETOZOA.

SUBCLASS I.—EXOSPOREÆ. Spores developed outside the sporophore.

Order I. — CERATIOMYXACEÆ. Sporophores membranous, branched; spores white, borne singly on filiform stalks arising from the areolated sporophore.

Genus 1. *Ceratiomyxa* (p. 17).

SUBCLASS II.—ENDOSPOREÆ. Spores developed inside the sporangium.

COHORT I.—AMAUROSPORALES. Spores violet-brown or purplish grey (ferruginous in *Stemonitis ferruginea* and *S. flavogenita*, colourless in *Echinostelium*).

Subcohort I.—CALCARINEÆ. Sporangia provided with lime (calcium carbonate).

Order I.—PHYSARACEÆ. Lime in the form of minute round granules innate in the sporangium-wall.

A. Capillitium charged with lime throughout.

Genus 2. *Badhamia* (p. 17).

B. Capillitium of hyaline threads with lime-knots (see Introduction, p. 12).

Genus 3. Sporangia single, subglobose or plasmodiocarps; capillitium without free hooked branches. *Physarum* (p. 19).

Genus 4. Sporangia forming an æthaliium. *Fuligo* (p. 22).

Genus 5. Plasmodiocarps; capillitium with free hooked branches. *Cienkowskia* (p. 23).

Genus 6. Sporangia goblet-shaped or ovoid; stalks cartilaginous. *Craterium* (p. 23).

Genus 7. Sporangia ovoid, shining, clustered; stalks membranous. *Leocarpus* (p. 24).

C. Capillitium without lime.

Genus 8. Sporangium-wall opaque. *Chondrioderma* (p. 24).

Genus 9. Sporangium-wall hyaline. *Diachæa* (p. 27).

Order II.—DIDYMIACEÆ. Lime in superficial crystals deposited outside the sporangium-wall.

Genus 10. Crystals stellate ; sporangia single.

Didymium (p. 27).

Genus 11. Crystals stellate ; sporangia forming an æthaliium.

Spumaria (p. 29).

Genus 12. Crystals lenticular.

Lepidoderma (p. 29).

Subcohort II.—AMAUROCHÆTINEÆ. Sporangia without lime.

Order I.—STEMONITACEÆ. Sporangia single, provided with a stalk and columella.

A. Sporangium-wall evanescent.

Genus 13. Capillitium spreading from the columella and forming a superficial net.

Stemonitis (p. 30).

Genus 14. Capillitium as above, but not forming a superficial net.

Comatricha (p. 31).

Genus 15. Capillitium springing from the apex of the sporangium.

Enerthenema (p. 33).

B. Sporangium-wall more or less persistent.

Genus 16. Capillitium radiating from the columella.

Lamproderma (p. 33).

Genus 17. Capillitium scanty, colourless, branching from a short columella ; sporangia very minute.

Echinostelium (p. 34).

Order II.—AMAUROCHÆTACEÆ. Sporangia combined into an æthaliium.

Genus 18. Capillitium irregularly branched.

Amaurochaete (p. 35).

Genus 19. Capillitium with chambered vesicles.

Brefeldia (p. 35).

COHORT II.—LAMPROSPORALES. Spores variously coloured, not violet (except in *Cribraria violacea*).

Subcohort I.—ANEMINEÆ. Capillitium wanting, or not forming a system of uniform threads.

Order I.—HETERODERMACEÆ. Sporangium-wall membranous, beset with microscopic round plasmodic granules.

Genus 20. Sporangia æthalioid, the wall not forming a persistent net.

Lindbladia (p. 35).

Genus 21. Sporangium-wall forming a persistent net.

Cribraria (p. 36).

Genus 22. Sporangium-wall forming numerous parallel ribs.

Dictydium (p. 37).

Order II.—LICEACEÆ. Sporangium-wall cartilaginous.

Genus 23. Sporangia solitary, sessile.

Licea (p. 37).

Order III.—TUBULINACEÆ. Sporangium-wall membranous, without microscopic round plasmodic granules.

Genus 24. Sporangia tubular, compacted. *Tubulina* (p. 38).

Order IV.—RETICULARIACEÆ.—Sporangia closely compacted and usually forming an æthaliium; true capillitium none, or in *diceopsis* consisting of a few branching threads and strands.

Genus 25. Sporangia columnar, inner walls reduced to straight slender threads. *Dictyd:æthaliium* (p. 38).

Genus 26. Sporangia interwoven, inner walls reduced to broad bands. *Enteridium* (p. 38).

Genus 27. Sporangia interwoven, inner walls laciniated. *Reticularia* (p. 39).

Genus 28. Sporangia subglobose, crowded inner walls complete. *Liceopsis* (p. 39).

Subcohort II.—CALONEMINEÆ. Capillitium present; a system of uniform threads.

Order I.—TRICHIACEÆ. Capillitium of free elaters, or an elastic network with spiral thickenings.

Genus 29. Elaters free, spirals distinct. *Trichia* (p. 39).

Genus 30. Elaters free, scanty, spirals obscure. *Oligonema* (p. 41).

Genus 31. Elaters combined into a web or network. *Hemitrichia* (p. 42).

Order II.—ARCYRIACEÆ. Capillitium a profuse network of threads (usually scanty and free in *Perichæna populina*), thickened with cogs, half rings, spines or warts.

Genus 32. Sporangia stalked, sporangium-walls evanescent above. *Arcyria* (p. 43).

Genus 33. Sporangia sessile, clustered, the walls single, persistent. *Lachnobolus* (p. 44).

Genus 34. Sporangia sessile, the walls usually double. *Perichæna* (p. 44).

Order III.—MARGARITACEÆ. Capillitium coiled and hairlike, or straight and attached to the sporangium-wall.

Genus 35. Capillitium profuse, coiled. *Margarita* (p. 45).

Genus 36. Capillitium straight. *Dianema* (p. 45).

Genus 37. Capillitium penicillate, spirally banded. *Prototrichia* (p. 46).

Order IV.—LYCOGALACEÆ. Sporangia forming an æthaliium; capillitium consisting of branched colourless tubes.

Genus 38. *Lycogala* (p. 47).

MYCETOZOA DE BARY.

[MYXOMYCETES WALLROTH.]

SUBCLASS I.—EXOSPOREÆ.

ORDER I.—CERATIOMYXACEÆ.

GENUS I. **CERATIOMYXA** Schroeter.—Surface of sporophores mapped out into polyhedral areolæ, from the centre of each of which arises a slender stalk bearing a single ellipsoid spore.

1. **C. mucida** Schroeter. — Sporophores white or pinkish-yellow, forming either simple or branching tufts. Spores white, ellipsoid, smooth, 10×6 to $13 \times 7 \mu$ diam.

Var. **porioides** Lister. — Sporophores forming a network resembling the hymenium of a *Polyporus*.

Hab. On rotten logs.

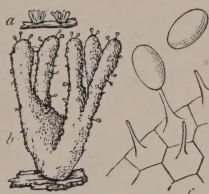


Fig. 9.
CERATIOMYXA MUCIDA Schroet.
a. Clusters of sporophores. Twice natural size.
b. Sporophore. Magnified 40 times.
c. Four areolæ of mature sporophore; one spore still attached to its stalk, and another free. Magnified 480 times.

SUBCLASS II.—ENDOSPOREÆ.

COHORT I.—AMAUROSPORALES.

SUBCOHORT I.—CALCARINEÆ.

ORDER I.—PHYSARACEÆ.

GENUS 2. **BADHAMIA** Berkeley. — Sporangium-wall membranous, containing lime-granules; capillitium a coarse network charged throughout with granules of lime; spores clustered or free.

* *Spores clustered*



Fig. 10.
BADHAMIA UTRICULARIS Berk.
a. Cluster of sporangia. Magnified $3\frac{1}{2}$ times.
b. Fragment of capillitium and spore-cluster. Magnified 140 times.

1. **B. hyalina** Berk. — Plasmodium yellow. Sporangia globose or pyriform, usually sessile, 1 to 1.5 mm. diam., greyish white. Capillitium of broad, branching, anastomosing bands, white. Spores dark purple-brown, adhering in clusters of 8 to 20, more strongly warted on the outer third, 11 to 13 μ diam.

Hab. On fir logs, etc.

2. **B. populina** Lister (Journ. Bot. 1904, p. 129). — Plasmodium white. Sporangia white, subglobose, 1.5 mm. diam., crowded, sessile.

Capillitium coarse, white. Spores $11\ \mu$ diam., in clusters of about 20, dark purple-brown, traversed by a narrow raised band, minutely spinulose, spines closer on one side.

Hab. On the bark of dead poplars.

3. **B. utricularis** Berk. — Plasmodium orange. Sporangia ovoid, subglobose, or lobed, $0\cdot7$ to $1\ \text{mm.}$ diam., clustered, with membranous yellow branching stalks, or sessile, cinereous or iridescent grey. Capillitium white. Spores bright brown, in loose clusters of 7 to 10, equally spinulose all over, 9 to $12\ \mu$ diam.

Hab. On old stumps, feeding on woody fungi.

4. **B. nitens** Berk. — Plasmodium yellow. Sporangia subglobose, crowded, sessile, $1\ \text{mm.}$ diam., golden or greenish yellow. Capillitium orange-yellow. Spores in close clusters of 6 to 10, purple-brown, coarsely warted on the outer third, 10 to $13\ \mu$ diam.

Hab. On rotten logs.

5. **B. versicolor** Lister (Journ. Bot. 1901, p. 81). — Sporangia subglobose, sessile, minute, $0\cdot3$ to $0\cdot5\ \text{mm.}$ diam., often crowded, grey or flesh-colour. Capillitium white or apricot colour. Spores ovoid, $12 \times 9\ \mu$ diam., in clusters of 10 to 40, dull purple and minutely warted on the broad end, nearly colourless and smooth elsewhere.

Hab. On lichen on tree trunks, 5 or 6 feet from the ground. Scotland.

** *Spores free*

6. **B. decipiens** Berk. — Sporangia subglobose or curved plasmodiocarps, $0\cdot4$ to $0\cdot7\ \text{mm.}$ diam., yellow or ochraceous, rugose. Capillitium coarse, orange-yellow. Spores free, 11 to $12\ \mu$ diam., purple-brown, spinulose.

Hab. On dead wood.

7. **B. macrocarpa** Rost. — Plasmodium white. Sporangia subglobose, sessile, or oftener with firm straw-coloured stalks, gregarious, $0\cdot5$ to $1\ \text{mm.}$ diam., white. Capillitium white. Spores free, dark purple-brown, minutely and closely spinulose, 11 to $15\ \mu$ diam.

Hab. On logs.

8. **B. panicea** Rost. — Plasmodium white. Sporangia subglobose, sessile, crowded, $1\ \text{mm.}$ diam., white, rugose. Capillitium white, with occasional narrow hyaline threads. Spores free, violet-brown, nearly smooth, $11\ \mu$ diam.

Hab. On bark of felled elms, etc.

9. **B. foliicola** Lister (Journ. Bot. 1897, p. 209). — Plasmodium orange. Sporangia subglobose, $0\cdot7\ \text{mm.}$ diam., iridescent grey, sessile or on slender stalks $0\cdot2$ to $0\cdot5\ \text{mm.}$ long. Capillitium white, typical of the genus, but slender and with lime scanty. Spores free, violet-brown, minutely spinulose, $11\ \mu$ diam.

Hab. On grass, dead leaves and twigs.

10. **B. ovispora** Racib.—Sporangia white or pale ochraceous, hemispherical, 0.5 mm. diam., or irregular plasmodiocarps, crowded or scattered. Sporangium-wall thick, fragile. Capillitium white, coarse, often forming a columella, fragile, with the lime granules loosely adhering. Spores free, purple-brown, ellipsoid, 10×8 to $16 \times 10 \mu$ diam., smooth, traversed lengthwise by a narrow raised band.

Hab. On old straw.

11. **B. lilacina** Rost.—Plasmodium lemon-yellow. Sporangia subglobose, sessile, crowded, 0.5 mm. diam., pale flesh-coloured. Capillitium pale flesh-coloured. Spores free, dark purple-brown, reticulated with prominent and confluent warts, 11 to 13 μ diam.

Hab. On decayed stumps and bog moss.

12. **B. rubiginosa** Rost.—Plasmodium yellow. Sporangia obovoid or subglobose, rufous-brown, pale above. Columella half the height of the sporangium. Capillitium pale rufous. Spores free, dark purple-brown, 11 to 15 μ diam.

Var. *a genuina* Lister.—Sporangia obovoid, 0.5 mm. diam. Stalk rufous, 0.4 mm. long. Spores minutely spinulose (not British).

Var. *β dictyospora* Lister—resembling var. *a* except in the spores which are marked with prominent confluent warts or reticulate.

Var. *γ globosa* Lister (Journ. Bot. 1904, p. 130).—Sporangia subglobose, somewhat depressed, 0.7 mm. broad, purplish grey. Stalk dark brown, 0.5 to 1 mm. long. Columella dark brown, clavate. Spores strongly reticulate and warted.

Hab. Var. *a* and *β* on dead leaves and brushwood; var. *γ* on moss on wet rocks.

GENUS 3. **PHYSARUM** Persoon.—Sporangium-wall membranous, with innate deposits of lime in round granules, either in clusters or densely compacted and chalky. Capillitium a network of delicate threads, with vesicular expansions filled with lime (lime-knots).

* *Sporangia usually stalked*

1. **P. leucopus** Link. — Plasmodium milk-white. Sporangia globose, gregarious, 0.5 mm. diam., glaucous-cinereous; stalk stout, chalk-white in section throughout. Columella none. Capillitium white; lime-knots large. Spores violet-brown, nearly smooth, 7 to 10 μ diam.

Hab. On dead leaves, etc.

2. **P. murinum** Lister. — Sporangia subglobose, stalked or sessile, pale brown, 0.5 mm. diam. Stalk brown, charged with lime throughout. Columella conical.



Fig. 11.

PHYSARUM NUTANS Pers.

a. Two sporangia. Magnified 9 times.

b. Capillitium threads, with lime-knots, attached to a fragment of the sporangium-wall. Magnified 110 times.

C

Capillitium persistent, with brown lime-knots. Spores violet-brown, nearly smooth, 8 to 10 μ diam.

Hab. On dead wood and leaves. Rare.

3. **P. citrinum** Schum.—Sporangia subglobose, gregarious, 0.4 to 0.7 mm. diam., yellow. Stalk stout, yellow, charged with lime throughout. Columella conical. Capillitium persistent; lime-knots yellow. Spores violet-brown, almost smooth, 7 to 8 μ diam.

Hab. On dead wood and moss.

4. **P. psittacinum** Ditm.—Plasmodium orange-yellow. Sporangia subglobose, gregarious, 0.5 mm. diam., purple or metallic green mottled with red. Stalk orange-red, translucent. Columella, none. Capillitium with bright orange lime-knots. Spores dull violet, nearly smooth, 7 to 8 μ diam.

Hab. On old stumps.

5. **P. penetrale** Rex.—Sporangia ellipsoid or globose, 0.4 to 0.6 mm. diam., smooth, grey. Stalk slender, translucent, dull red, continued as a columella three-fourths the height of the sporangium. Capillitium slender, with small yellow lime-knots. Spores pale violet-brown, 6 μ diam.

Hab. On liverworts. Scotland.

6. **P. viride** Pers.—Plasmodium yellow. Sporangia lenticular or subglobose, nodding, scattered, 0.5 mm. diam., yellow, greenish, orange, or white. Stalk subulate, translucent, containing refuse matter. Capillitium slender; lime-knots fusiform, orange. Spores violet-brown, nearly smooth, 7 to 10 μ diam.

Hab. On rotten stumps. Common.

7. **P. Berkeleyi** Rost.—Plasmodium yellowish green. Sporangia subglobose, 0.5 mm. diam., yellow. Stalk translucent, red-brown. Capillitium slender with flat expansions at the axils and numerous yellow angular lime-knots. Spores pale violet-brown, 7 μ diam.

Hab. On dead wood.

8. **P. nutans** Pers.—Plasmodium watery-white. Sporangia lenticular or subglobose, erect or nodding, gregarious, 0.4 to 1 mm. diam., pale grey. Stalk subulate, straw-coloured or dark, sometimes white, containing refuse matter. Capillitium slender, with flat expansions at the axils; lime-knots small, white; spores violet-brown, nearly smooth, 8 to 11 μ diam.

Var. **leucophæum** Lister.—Sporangia erect, stalked, or plasmodiocarps; stalks stouter, capillitium more rigid, lime-knots larger.

Hab. On dead wood. Common.

9. **P. calidris** Lister.—Sporangia globose, scattered, 0.5 mm. diam., white. Stalk red, translucent. Capillitium-threads slender; lime-knots white, irregular in shape and size. Spores pale brownish violet, nearly smooth, 8 to 11 μ diam.

Hab. On dead leaves, straw, etc.

10. **P. compressum** Alb. & Schw.—Plasmodium white. Sporangia subglobose or lobed, compressed; stalked, sessile or plasmodiocarps, grey or white. Stalk dark or white, containing refuse matter. Capillitium-threads terete, flexuose; lime-knots white, numerous. Spores dark purplish brown, spinulose, 9 to 14 μ diam.

Hab. On dead wood, bark, straw and leaves. A very variable species.

11. **P. straminipes** List.—Plasmodium white. Allied to *P. compressum*, differing in the stalks, which, when present, are often long, slender, of a pale straw colour and free from refuse matter, also in the more rigid persistent capillitium, and in the sculpture of the spores, on which the warts are crowded in broad patches separated by smooth tracts.

Hab. On old straw and dead leaves.

12. **P. didermoides** Rost.—Plasmodium white. Sporangia ovoid, erect, stipitate, crowded, 0.5 mm. diam.; sometimes subglobose and sessile, white, or dark grey from the falling away of the outer calcareous crust from the purplish inner wall. Stalk short, white, membranous, free from refuse matter. Capillitium-threads terete, connecting numerous rounded lime-knots. Spores very dark purple-brown, closely and minutely spinulose, 10 to 13 μ diam.

Hab. On old straw and dead leaves.

Var. **lividum** Lister differs from the type in the sporangia being always sessile and subglobose, grey, with usually a single sporangium-wall, and also in the rougher purple-black spores being somewhat paler on one side.

Hab. On old straw.

13. **P. Crateriachea** Lister (*Crateriachea mutabilis* Rost.).—Sporangia white, rugose; either ovoid, 0.4 to 0.6 mm. diam., erect, seated on an ochraceous hypothallus which is often produced into a short ochraceous stalk, or forming plasmodiocarps. Capillitium a persistent network of hyaline threads; lime-knots confluent in the centre of the sporangium and forming an elongate clavate pseudocolumella, sparsely distributed elsewhere. Spores purple-brown, spinulose, 8 μ diam.

Hab. On straw and rotting herbaceous stems.

** *Sporangia sessile*

14. **P. cinereum** Pers.—Plasmodium white. Sporangia sessile, subglobose, or plasmodiocarps, scattered or crowded, 0.3 to 0.5 mm. diam., pale grey. Capillitium with numerous white lime-knots, often *Badhamia*-like. Spores violet brown, nearly smooth, 7 to 10 μ diam.

Hab. On dead leaves.

15. **P. vernum** Somm.—Closely allied to *P. cinereum*. Plasmodium white. Sporangia white, or often iridescent purple from absence of lime in the wall. Spores purplish brown. The darker colour of the spores is the chief distinguishing character.

Hab. On old straw and dead leaves.

16. **P. bivalve** Pers.—Plasmodium white. Sporangia sessile, elongate, laterally compressed, wall-like, straight or flexuose, splitting longitudinally, white or buff. Capillitium of numerous white lime-knots connected by short hyaline threads. Spores violet-brown, spinulose, 8 to 10 μ diam.

Hab. On dead leaves and twigs.

17. **P. Diderma** Rost.—Plasmodium white. Sporangia sessile, subglobose, or elongate compressed plasmodiocarps, 0.6 mm. or more wide; the white outer sporangium-wall peeling off and disclosing the purplish inner layer. Capillitium with numerous large white lime-knots. Spores purplish brown, spinulose, 10 to 12 μ diam.

Hab. On dead leaves and twigs.

18. **P. contextum** Pers.—Plasmodium yellow. Sporangia sessile, subglobose, or curved, crowded, 0.5 mm. diam., ochraceous, the wall densely calcareous. Capillitium of numerous branching white lime-knots with short connecting threads. Spores dark violet-brown, spinulose, 10 to 13 μ diam.

Hab. On dead leaves and twigs.

19. **P. conglomeratum** Rost.—This species resembles *P. contextum* in general appearance, but differs in the spores, which are pale violet-brown, nearly smooth, 8 to 10 μ diam.

Hab. On dead leaves and twigs.

20. **P. virescens** Ditm.—Plasmodium yellow. Sporangia sessile, irregularly ovoid, 0.2 to 0.3 mm. diam., aggregated in clusters, rugose, yellowish green. Capillitium delicate, flexuose, often scanty, lime-knots yellow. Spores pale violet-brown, nearly smooth, 6 to 9 μ diam.

Var. **obscurum** Lister.—Sporangia more scattered, smooth, olive-brown, often forming plasmodiocarps, 0.5 mm. diam.

Hab. On dead leaves, etc.

Var. **nitens** Lister.—Sporangia gregarious, not clustered, bright yellow, 0.5 to 0.8 mm. diam.

GENUS 4. **FULIGO** Haller.—Æthaliium consisting of interwoven anastomosing sporangia enclosed by a barren cortex.

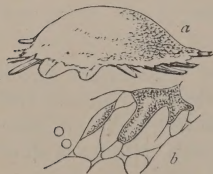


Fig. 12.—**FULIGO SEPTICA** Gmel.

a. Æthaliium. One-third natural size.

b. Capillitium threads with lime-knots and two spores. Magnified 120 times.

1. **F. septica** Gmel. — Plasmodium yellow. Æthalia pulvinate, from 2 mm. to 20 cm. broad, yellow, sometimes cinereous, reddish or white. Sporangium-walls within the æthaliium containing scattered innate deposits of lime. Capillitium of hyaline threads with yellow or whitish lime-knots. Spores violet, nearly smooth, 6 to 10 μ diam.

Hab. On rotten wood, tan, etc.
Common.

2. **F. muscorum** Alb. & Schw. (*F. ochracea* Peck).—Plasmodium orange. Æthalia pulvinate, somewhat rugose, ochraceous or grey flecked with yellow, about 1 cm. long. Cortex obsolete. Hyaline threads of the capillitium scanty; lime-knots abundant, angular and branching, dull yellow or orange. Spores violet-brown, spinulose, 10 to 11 μ diam.

Hab. On rushes, moss, &c., in moist places.

3. **F. ellipsospora** List.—Æthalia pulvinate, rounded or elongate, 2 to 6 cm. long, white. Cortex even, densely calcareous, or obsolete. Capillitium pure white, either *Badhamia*-like or with broad irregular lime-knots connected by hyaline threads. Spores elliptical or nearly spherical, purple-brown, spinulose, usually 12 to 14 by 8 to 10 μ diam.

Hab. On old straw and dead leaves.

GENUS 5. **CIENKOWSKIA** Rostafinski.—Sporangium-wall cartilaginous at the base. Capillitium a loose network of rigid threads, with many free, curved, sharp-pointed branchlets, connected with vertical flat perforated calcareous plates attached at their margins to the sporangium-wall.

1. **C. reticulata** Rost.—Plasmodiocarps cylindrical, winding, 0.5 mm. diam., usually anastomosing and forming a net, yellow-brown, blotched with crimson. Capillitium-threads yellow; the calcareous plates pale yellow. Spores violet-brown, minutely spinulose, 9 to 11 μ diam.

Hab. On dead wood. Rare.

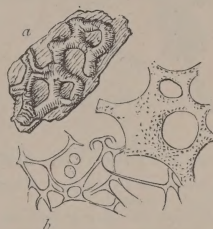


Fig. 13.

CIENKOWSKIA RETICULATA
Rost.

- a. Part of branching plasmodiocarp. Magnified 4 times.
b. Capillitium-threads and part of a perforated lime-plate. Magnified 140 times.

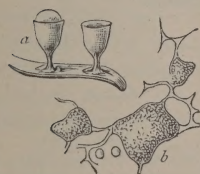


Fig. 14.

CRATERIUM PEDUNCULATUM
Trent.

- a. Two sporangia; in one the lid has fallen away. Magnified 10 times.
b. Capillitium with lime-knots and two spores. Magnified 110 times.

GENUS 6. **CRATERIUM** Trentepohl.—Sporangia stalked, goblet-shaped or ovoid, usually dehiscing with a distinct lid; sporangium-wall charged with granules of lime, cartilaginous in the lower part, thinner above. Capillitium containing large lime-knots often confluent in the centre of the sporangium as a pseudo-columella.

1. **C. pedunculatum** Trent.—Plasmodium yellow. Sporangia smooth, goblet-shaped, ochraceous, with a pale lid. Capillitium with many large white lime-knots. Spores violet-brown, nearly smooth, 8 to 9 μ diam.

Hab. On dead leaves. Common.

2. **C. leucocephalum** Ditm.—Plasmodium yellow. Sporangia top-shaped or ovoid, stalked, red-brown, with white mealy deposits, and sprinkled yellow granules on the upper half and lid. Capillitium with large white or yellowish lime-knots. Spores violet-brown, spinulose, 7 to 9 μ diam.

Hab. On dead leaves.

3. **C. mutabile** Fr.—Plasmodium lemon-yellow. Sporangia ovoid, stalked, without a distinct lid, yellow, the wall thin, rough, with innate clusters of yellow lime granules. Capillitium with pale yellow lime-knots. Spores violet-brown, spinulose, 8 to 9 μ diam.

Hab. On dead leaves.

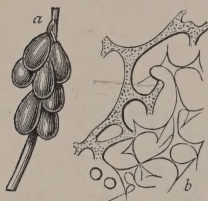


Fig. 15.

LEOCARPUS VERNICOSUS Link.

- a. Cluster of sporangia. Magnified 2½ times.
b. Hyaline threads and branching lime-knot of the capillitium, with two spores. Magnified 120 times.

GENUS 7. **LEOCARPUS** Link.—Sporangium-wall uniform, of two layers; the outer cartilaginous and calcareous, shining; the inner hyaline. Capillitium a network of hyaline threads combined with branched and anastomosing brownish lime-knots.

1. **L. vernicosus** Link.—Sporangia ellipsoid, crowded, chestnut-brown, shining as if varnished, with short membranous stalks. Capillitium as in the genus. Spores violet-brown, 11 to 13 μ diam.

Hab. On dead leaves, etc.

GENUS 8. **CHONDRIDERMA** Rostafinski.—Sporangium-wall of two layers (except in *C. simplex*), containing granular deposits of lime. Capillitium without lime-knots.

Subgenus 1. *Euchondrioderma*.—Sporangia mostly sessile, the outer wall a smooth crust composed of globular lime-granules, the inner membranous.

1. **C. spumarioides** Rost.—Plasmodium white. Sporangia subglobose, white, sessile, 0.5 to 1 mm. diam., crowded; the two layers of the wall usually adhering. Hypothallus profuse, rarely wanting. Columella convex, pale. Capillitium of slender purplish flexuose threads. Spores violet-brown, minutely spinulose, 8 to 11 μ diam.

Hab. On leaves.

2. **C. globosum** Rost.—Differs from *C. spumarioides* in the

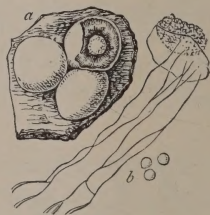


Fig. 16.

CHONDRIDERMA TESTACEUM Rost.

- a. Group of three sporangia; in the upper one the double wall is broken away in part and the columella exposed. Magnified 9 times.
b. Portion of the outer and inner layers of the sporangium-wall; to the latter the capillitium-threads are attached; three spores. Magnified 170 times.

outer layer of the sporangium-wall separating more freely from the inner, and in the larger, darker, more spinulose spores, 10 to 14 μ diam.

Hab. On dead leaves, etc.

3. **C. testaceum** Rost.—Plasmodium pale buff. Sporangia subglobose, sessile on a broad base, 0.8 mm. diam., pale flesh-coloured; the eggshell-like outer wall of the sporangium separating from the inner. Columella large, hemispherical, reddish brown. Capillitium very slender, nearly colourless. Spores pale violet-brown, nearly smooth, 7 to 8 μ diam.

Hab. On dead leaves.

4. **C. Michelii** Rost.—Plasmodium opaque white. Sporangia disc-shaped, white, 1 to 1.2 mm. diam., on a stout, pale ochraceous, central stalk, rarely sessile. Columella indefinite. Capillitium and spores as in *C. testaceum*.

Hab. On dead leaves, etc.

5. **C. reticulatum** Rost.—Plasmodium white. Sporangia sessile, white, hemispherical, flattened, 0.7 mm. diam., or branching plasmodiocarps often forming a net. Capillitium and spores as in *C. Michelii*.

Hab. On dead leaves.

6. **C. niveum** Rost.—Sporangia subglobose, 1 mm. or more in diam., or branching plasmodiocarps, white; the outer layer of the sporangium-wall thick, the inner membranous. Columella broad, convex, or almost plane, orange. Capillitium dark, somewhat rigid, warted. Spores violet-brown, minutely spinulose, 9 to 11 μ diam.

Hab. On dead leaves and twigs.

7. **C. simplex** Schroet.—Plasmodium yellow-brown. Sporangia crowded, reddish clay-colour, sessile, subglobose or irregular in shape and size, about 0.6 mm. diam. Sporangium-wall single, membranous, beset with brown granules. Columella indefinite, rugose. Capillitium slender, colourless, often beaded with scattered brown granules. Spores brownish violet, minutely warted, 8 to 10 μ diam.

Hab. On boggy moors and on dead leaves.

Subgenus 2. *Leangium*.—Sporangia mostly stalked; sporangium-wall often dehiscing in revolute lobes; of two inseparable layers (separable in *C. Sauteri*), the outer cartilaginous, charged with minute granules of lime, the inner membranous.

8. **C. Trevelyani** Rost.—Sporangia roundly ovoid, 1 mm. diam., shortly stalked or sessile, chestnut-brown. The sporangium-wall differs from that in all other species of the subcohort *Calcarineæ* in

being constructed of an outer cartilaginous brown layer, a thick middle layer consisting of white crystalline calcareous deposits, and a delicate membranous inner layer, to which the ends of the capillitium are attached. Columella none. Capillitium a network of purple threads, with dark thickenings at the nodes. Spores dark violet-brown, spinulose, 10 to 12 μ diam.

Hab. On dead leaves.

9. **C. Sauteri** Rost.—Sporangia subglobose, depressed, sessile, pale pinkish-brown; outer layer of sporangium-wall cartilaginous, brittle, separating from the membranous inner layer. Columella indistinct. Capillitium of sparingly branched colourless or grey threads, 2 to 3 μ diam. Spores dark violet-brown, spinulose, 10 to 13 μ diam.

Hab. On dead wood and moss. Rare.

10. **C. ochraceum** Schroet.—Plasmodium lemon-yellow. Sporangia sessile, hemispherical, or curved and sometimes ring-shaped plasmodiocarps, 1 to 2 mm. long, clustered or solitary, ochraceous. Columella indefinite. Capillitium-threads purple, abundant. Spores purplish grey, minutely spinulose, 11 μ diam.

Hab. On moss and liverworts. Wales.

Perhaps a form of *Lepidoderma tigrinum*, with which it is often found associated.

11. **C. radiatum** Rost.—Plasmodium yellowish white. Sporangia subglobose, umbilicate beneath, about 1 mm. diam., usually with a short stout stalk, pale grey or brownish; sporangium-wall cartilaginous, obscurely granular, with an inseparable membranous inner layer. Columella hemispherical. Capillitium dark violet-brown, rigid, sparingly branched; spores purplish brown, minutely spinulose, 9 to 12 μ diam.

Hab. On dead leaves, twigs, etc.

12. **C. floriforme** Rost.—Plasmodium greyish white. Sporangia globose, 0.8 mm. diam., white or cinnamon; sporangium-wall dehiscing on drying in revolute lobes. Stalks longer than in the last species. Columella ovoid. Capillitium of slender violet-brown threads with bead-like thickenings. Spores red-violet-brown, with widely scattered coarse warts, 9 to 11 μ diam.

Hab. On oak stumps and twigs.

13. **C. lucidum** Cooke.—Plasmodium yellow. Sporangia subglobose, flattened beneath, orange, shining, 0.8 mm. diam. Sporangium-wall translucent. Stalk subulate, black. Capillitium of scanty black coarse threads forming a loose network with broad expansions at the axils. Spores dark purplish grey, closely spinulose, 14 μ diam.

Hab. On mosses on wet rocks.

GENUS 9. **DIACHÆA** Fries.—Lime present in the stalk and columella, entirely absent from the purple capillitium and iridescent sporangium-wall.

1. **D. elegans** Fries.—Plasmodium white. Sporangia cylindrical, 0.25 mm. diam., iridescent purple; stalk white. Columella narrowing upwards, white, giving rise to the closely branching capillitium. Spores dull violet, nearly smooth, 7 to 9 μ diam.

Hab. On dead leaves.

2. **D. subsessilis** Peck.—Plasmodium yellow. Sporangia globose, 0.5 mm. diam., iridescent purple. Stem short, thick, white, charged with lime, or dark brown and without lime. Columella short, conical or obsolete. Capillitium a network of purple-brown or sometimes colourless threads. Spores purplish green, the contents yellow, reticulate with rows of minute spines forming about six meshes across the hemisphere, 8 to 10 μ diam.

Hab. On dead leaves and twigs.

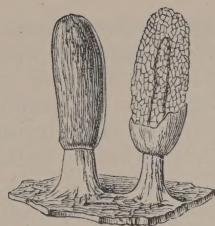


Fig. 17.
DIACHÆA ELEGANS Fries.

Two sporangia, the one entire, the other deprived of the spores and showing capillitium and columella. Magnified 22 times.

ORDER II.—DIDYMIACEÆ.

GENUS 10. **DIDYMIUM** Schrader.—Sporangia stalked or sessile; lime-crystals either scattered on the membranous sporangium-wall, or closely combined and forming a crust; capillitium often thickened at intervals with dark nodes.

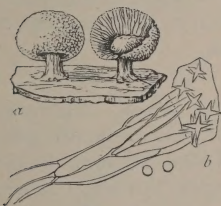


Fig. 18.

DIDYMIUM EFFUSUM Link.

- a. Two sporangia, one entire, the other showing columella and capillitium. Magnified 12 times.
b. Capillitium and fragment of sporangium-wall, with crystals of calcium carbonate and two spores. Magnified 200 times.

* *Superficial crystals closely combined to form a thin eggshell-like crust*

1. **D. difforme** Duby.—Plasmodium colourless or pale yellow. Sporangia white, depressed, pulvinate, on a broad yellowish base, or plasmodiocarps; lime-crystals minute, densely combined to form a smooth, eggshell-like crust, often separating from the iridescent inner sporangium-wall. Columella none. Capillitium scanty, the threads broad at the base, branched above, dark or colourless. Spores dark purple-brown, nearly smooth, 11 to 14 μ diam.

Hab. On dead leaves. Common.

Var. **comatum** Lister (Journ. Bot. 1901, p. 8).—Capillitium profuse, of slender equal threads not thickened at the base, dark or colourless.

2. **D. Trochus** Lister (Journ. Bot. 1898, p. 164).—Plasmodium

bright yellow. Sporangia hemispherical or top-shaped, 0.8 mm. diam., pale ochre or white, stalked or sessile; the sporangium-wall readily falling off entire, the outer layer eggshell-like, usually adhering to the membranous inner layer. Columella convex, broad, with an orange-brown rim, seated on the dilated apex of the yellowish brown stalk, filled with stellate crystalline masses of lime. Capillitium rigid and persistent, dark or colourless, nearly simple or branched. Spores brownish purple, 9 to 10 μ diam., strongly warted.

Hab. On old straw and dead leaves.

3. **D. dubium** Rost.—Plasmodium colourless. Sporangia flat, white, rounded or irregular plasmodiocarps 1 to 12 mm. broad, solitary; lime-crystals large stellate, adhering to form a frosted crust often extending beyond the margin of the broad membranous base of the sporangium. Columella none. Capillitium profuse, of rigid purple-brown erect anastomosing threads, slender above and below. Spores violet-grey, nearly smooth, 8 to 11 μ diam.

Hab. On dead leaves.

*** Superficial crystals scattered or loosely combined*

4. **D. Serpula** Fr.—Plasmodium yellow. Sporangia thin, effused, grey plasmodiocarps, 2 to 8 mm. diam. Columella none. Capillitium of slender threads connected with large scattered purplish vesicles, 20 to 50 μ diam., filled with yellowish granular matter. Spores pale violet-brown, nearly smooth, 7 to 9 μ diam.

Hab. On dead leaves and twigs.

5. **D. Clavus** Rost.—Plasmodium colourless. Sporangia grey, 0.7 to 1 mm. diam., disc-like, on a dark stalk, in shape resembling a flat-headed nail. Columella indefinite. Capillitium profuse. Spores pale violet-brown, almost smooth, 6 to 8 μ diam.

Hab. On dead leaves.

6. **D. farinaceum** Schrad.—Plasmodium colourless. Sporangia about 1 mm. diam., hemispherical, deeply umbilicate beneath, grey; sporangium-wall mottled with brown. Stalk and broad columella dark opaque-brown. Capillitium of coarse pale or dark threads. Spores dark purplish grey, spinulose, 9 to 11 μ diam.

Var. **minus** Lister.—Sporangia smaller, with short stalks and slender capillitium; spores nearly smooth, 7 to 9 μ diam.

Hab. On dead leaves and bark.

7. **D. nigripes** Fr. — Distinguished from *D. farinaceum* var. *minus*, in the stalk being longer and more slender, and in being horn-clear instead of opaque and granular.

Var. **xanthopus** Fr.—Stalk orange. Columella white.

Hab. On dead leaves.

8. **D. effusum** Link.—Plasmodium colourless. Sporangia very various, subglobose, hemispherical, stalked, sessile, or effused plasmodiocarps, white or grey; the stellate crystals adhering to form a

wrinkled crust, or scattered; stalk short, white, opaque, rarely orange. Columella white. Capillitium colourless or dark. Spores violet-brown, spinulose, 8 to 11 μ diam.

Hab. On dead leaves.

9. **D. anellus** Morgan (Journ. Cincinnati Soc. Nat. Hist., xvi., p. 148, 1894).—Sporangia annular or irregular plasmodiocarps, depressed in the centre; crystals of lime on the wall scanty. Columella indefinite. Capillitium of slender flexuose violet-brown threads. Spores minutely spinulose, pale purple-brown, 7 to 8 μ diam.

Hab. On dead leaves.

10. **D. crustaceum** Fr.—Distinguished from *D. effusum* by the sporangia being often clustered and reniform on membranous stalks, by their being enclosed in a thick smooth fragile globose crust of loosely adhering large crystals, and by the more strongly spinulose spores, 10 to 13 μ diam.

Hab. On dead leaves, etc.

GENUS II. **SPUMARIA** Persoon.—Sporangia confluent, forming an æthelium enclosed in a mass of white lime-crystals; the other characters as in *Didymium*.

1. **S. alba** DC.—Sporangia elongate and lobed. Columella hollow. Capillitium much branched. Spores dull purple, strongly spinulose, 10 to 13 μ diam.

Hab. On grass, dead leaves, etc.

Var. **dictyospora** Fries (Arkiv Botanik, i., p. 66, 1903), differs from the type in the very dark, closely reticulated spores.

Hab. On straw. Bedfordshire.



Fig. 19.—*SPUMARIA ALBA* DC.

- a. Æthelium. Natural size.
b. Capillitium and fragment of sporangium-wall, with crystals of calcium carbonate and two spores. Magnified 200 times.

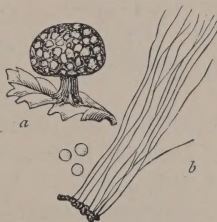


Fig. 20.

LEPIDODERMA TIGRINUM Rost.

- a. Sporangium. Magnified 6 times.
b. Capillitium and spores. Magnified 140 times.

GENUS 12. **LEPIDODERMA** de Bary.—Sporangium-wall cartilaginous, beset with superficial crystalline discs or scales. Capillitium usually rigid.

1. **L. tigrinum** Rost.—Plasmodium orange-yellow. Sporangia subglobose, flattened beneath, dull olive; crystalline discs white.

Stalk and hemispherical columella dull orange. Capillitium purple. Spores dark purplish grey, minutely spinulose, about $10\ \mu$ diam.

Hab. On bark and moss.

Chondrioderma ochraceum Schroet. is perhaps a form of this species.

2. *L. Carestianum* Rost. forma *Chailletii* Lister.—Sporangia subglobose, grey, sessile, rarely shortly stalked, or plasmodiocarps; sporangium-wall membranous, covered with amorphous calcareous scales 10 to $40\ \mu$ diam., which may be in part absent. Columella buff, prominent, obtuse, or nearly wanting, filled with crystals of lime. Capillitium purple, rather slender, more or less beset with nodular thickenings; hypothallus dull orange, spongy, the surface thickly beset with calcareous scales. Spores purple-brown, 10 to $13\ \mu$ diam., minutely spinulose.

Hab. On dead elm leaves. Failand, Somerset.

SUBCOHORT II.—*AMAUROCHÆTINEÆ*.

ORDER I.—STEMONITACEÆ.

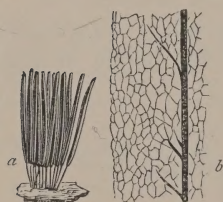


Fig. 21.

STEMONITIS SPLENDENS Rost.

a. Group of sporangia. Natural size.

b. Portion of capillitium and columella. Magnified 42 times.

GENUS 13. *STEMONITIS* Gleditsch.

—Sporangia cylindrical, stipitate, fasciculate; stalk continued as a columella to near the apex of the sporangium. Capillitium radiating from all parts of the columella, the ultimate branches normally uniting to form an even superficial net.

1. *S. fusca* Roth.—Plasmodium white. Sporangia dark or reddish brown, 4 to 15 mm. high. Superficial net of the capillitium with angular meshes varying in size from 7 to $20\ \mu$ diam. Spores grey, or rufous-violet, closely reticulate and spinulose, 6 to $10\ \mu$ diam.

Var. *flaccida* Lister.—Sporangia weak. Capillitium scarcely forming a surface net.

Var. *confluens* Lister.—Sporangia confluent, without superficial net or columellæ.

Hab. On dead wood. Common.

2. *S. splendens* Rost.—Plasmodium white. Sporangia rich purple-brown in mass, about 12 mm. long. Capillitium purple-brown; intermediate threads distant, nearly simple; surface net with smooth rounded meshes 30 to $50\ \mu$ broad. Spores pale reddish purple, nearly smooth, minutely warted, 7 to $8\ \mu$ diam.

Hab. On dead wood. The type not recorded as British.

Var. *Webberi* Lister.—Mesh of surface net 80 to $100\ \mu$ broad.

Hab. On dead wood. Cornwall and Ireland.

Var. **flaccida** Lister.—Sporangia weak, adhering. Capillitium lax, scarcely forming a surface net; membranous flakes of sporangium-wall always present.

Hab. On dead wood, chiefly fir. Common.

Var. **confluens** Lister.—Sporangia confluent, without surface net or definite columellæ.

Hab. On sticks and dead leaves.

3. **S. herbatica** Peck.—Plasmodium white. Sporangia brown, about 0.8 mm. long; mesh of surface net of the capillitium 10 to 20 μ broad. Spores pale reddish grey, nearly smooth, 6 to 8 μ diam.

Hab. On stumps, dead leaves, etc. Distinguished from *S. splendens* by the smaller meshes of the surface net and grey spores.

4. **S. flavogenita** Jahn (Abh. Bot. Ver. Brandenb., xlv., p. 165, 1904).—Plasmodium yellow. Sporangia cinnamon-brown, 5 to 7 mm. high. Meshes of the capillitium net as in *S. fusca*, but the threads more slender. Spores pale ferruginous, nearly smooth, 8 to 9 μ diam.

Hab. On dead wood.

5. **S. ferruginea** Ehrenb. (*S. Smithii* Macbr., see Journ. Bot. 1904, p. 134).—Plasmodium white. Distinguished from *S. flavogenita* by the longer sporangia and stalks, and minute spores, 4 to 6 μ diam.

Hab. On dead wood.

GENUS 14. COMATRICHA Preuss.—

Sporangia subglobose or cylindrical, stalked, gregarious. Capillitium as in *Stemonitis*, except that it is more dense, and the ultimate branches do not unite to form an even superficial net.

1. **C. obtusata** Preuss.—Plasmodium watery white. Sporangia globose, ellipsoid, or cylindrical, purple-brown. Total height, 1 to 6 mm. Stalks slender. Capillitium a dense tangle of purplish brown threads; ultimate branches curved and anastomosing. Spores brownish violet, nearly smooth, 7 to 11 μ diam.

Hab. On dead wood. Common.

2. **C. laxa** Rost.—Distinguished from *C. obtusata* by the lax capillitium, and by the branches spreading from the columella in a more straight and radiating direction.

Hab. On dead wood.

3. **C. elegans** Lister (*Raciborskia elegans* Berl.).—Sporangia globose, on slender stalks. Columella short, soon dividing into the few primary branches of the capillitium: these again branch repeatedly,

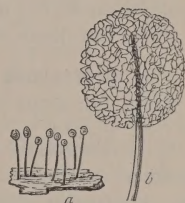


Fig. 22.

COMATRICHA OBTUSATA Preuss.

a. Group of sporangia. Natural size.

b. Sporangium deprived of spores, showing the capillitium. Magnified 16 times.

and form towards the surface of the sporangium a loose tangle of slender flexuose anastomosing threads. Spores pale brownish-violet, 8 to 10 μ diam.

On dead wood. Very closely allied to *C. obtusata*.

4. *C. lurida* Lister. — Plasmodium watery white. Sporangia globose, purple-brown, 0.5 mm. diam. Stalk setaceous, 0.75 mm. long. The purple-brown flexuose capillitium spreads from the upper half of the branching columella, which reaches to half the height of the sporangium. Spores subglobose, purplish grey, warted, 8 to 10 μ diam.

Hab. On dead leaves.

5. *C. typhoides* Rost. — Plasmodium watery white. Sporangia shortly cylindrical, 1.5 to 2.5 mm. long, brown after the disappearance of the silvery sporangium-wall, which is continued over the black stalk. Columella reaching to near the apex of the sporangium. Capillitium a close network of pale-brown flexuose threads with many free ends. Spores pale violet-brown, almost smooth, with 3 or 4 prominent warts on the hemisphere, 6 to 7 μ diam.

Hab. On rotten wood.

Var. *heterospora* Rex. — Sporangia more rufous in colour; sporangium-wall evanescent, stalk without a silvery sheath. Spores 5 to 6 μ diam., faintly reticulate between the warts, which high magnification shows to consist of close meshes.

Hab. On dead wood.

Var. *microspora* Lister. — Spores 3.5 to 4.5 μ , nearly smooth.

Hab. On dead leaves.

6. *C. Persoonii* Rost. — Plasmodium watery-white. Sporangia cylindrical or clavate, rufous-brown, including the stalk about 1 mm. high; columella nearly reaching the apex. Capillitium dense, of flexuose brown threads, the ultimate branches curved and anastomosing, with few free ends. Spores pale lilac-brown, minutely warted, 6 to 8 μ diam.

Hab. On dead leaves.

Var. *tenerrima* Lister. — Sporangia slender, on longer stalks. Spores and the delicate capillitium flesh-colour.

Var. *fusca* Lister (Journ. Bot. 1897, p. 215). — Closely allied to the type, but with darker spores.

7. *C. rubens* Lister. — Plasmodium watery white. Sporangia subglobose or pyriform, pinkish brown, including the stalk about 1.5 mm. high. Columella branched above, and reaching two-thirds the height of the sporangium. Capillitium brownish violet, branching from all parts of the columella, with slender free ends. The lower

branches have broad attachments to the lower part of the sporangium-wall, which forms a persistent cup. Spores as in *C. Persoonii*.

Hab. On dead leaves.

GENUS 15. **ENERTHENEMA** Bowman.—Sporangia stipitate. Columella reaching to the summit of the sporangium. Capillitium springing from beneath the superficially extended apex of the columella.

1. ***E. elegans*** Bowm.—Plasmodium colourless. Sporangia globose, black. Capillitium-threads long, sparingly branched. Spores greyish brown, spinulose, 8 to 10 μ diam.

Hab. On dead wood.

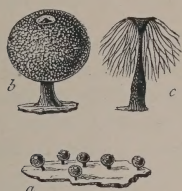


Fig. 23.

ENERTHENEMA ELEGANS BOWM.

- a. Group of sporangia. Twice the natural size.
- b. Sporangium. Magnified 16 times.
- c. Sporangium deprived of spores, showing the capillitium. Magnified 16 times.

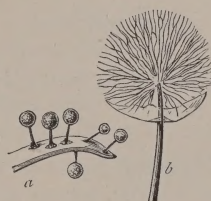


Fig. 24.

LAMPRODERMA IRIDEUM MASS.

- a. Group of sporangia. Magnified 2½ times.
- b. Sporangium deprived of spores, showing capillitium. Magnified 25 times.

GENUS 16. **LAMPRODERMA** Rostafinski.—Sporangia globose or ellipsoid, stipitate; sporangium-wall somewhat persistent, shining with iridescent colours. Capillitium of branching and anastomosing threads radiating from the upper part of the columella.

1. ***L. physaroides*** Rost.—Plasmodium colourless. Sporangium ovoid or globose, 0.5 to 0.8 mm. diam. Stalk 1 to 2 mm. long. Columella more than half the height of the sporangium. Capillitium of purple-brown threads, straight and sparingly anastomosing below, much branched and slender towards the surface. Spores purple-grey, closely spinulose, 11 to 14 μ diam.

A sessile form occurs without a columella.

Hab. On fir wood and moss.

2. ***L. echinulatum*** Rost.—Total height 2 to 2.5 mm. Sporangia globose, 0.7 mm. diam. Columella cylindrical, obtuse, half the height of the sporangium. Capillitium lax, springing from the upper part of the columella, of nearly straight, forking black strong threads with pale tips. Spores dark grey, echinulate with black spines, 15 to 20 μ diam.

Hab. On dead wood.

3. *L. arcyryonema* Rost.—Plasmodium colourless. Total height 1 to 1.5 mm. Sporangia globose, 0.5 mm. diam. Columella half the height of the sporangium, slender, smooth to the apex, where it divides into the primary branches of the dense black crisped capillitium. Spores lilac-grey, smooth, 6 to 7 μ diam.

Hab. On dead wood.

4. *L. irideum* Mass.—Plasmodium colourless. Total height 1 to 1.5 mm. Sporangia globose, on setaceous stalks. Columella cylindrical, half the height of the sporangium. Capillitium of rigid, dichotomously branched, blackish threads, colourless at the base, where they are attached to the truncate apex of the columella. Spores marked with minute, not crowded warts, 6.5 to 8 μ diam.

Hab. On dead leaves. Common.

5. *L. violaceum* Rost.—Plasmodium colourless. Total height, 0.6 to 1.5 mm. Sporangia subglobose on setaceous or thicker stalks. Columella one-third to two-thirds the height of the sporangium. Capillitium pale and flaccid, or brown and dense. Spores purplish grey or purple-brown, closely spinulose, 8 to 11 μ diam.

Var. *Sauteri* Lister is a robust form; stalks thickened below; capillitium brown; spores 11 to 15 μ diam.

Var. *Carestiæ* Lister.—Capillitium dense, flexuose, dark violet-brown.

Hab. On sticks and dead leaves.

A variable species, sometimes resembling forms of *L. irideum*, but distinguished by the spores; these, when highly magnified, are seen to be marked with closely set, often very minute spines, and not with the more distant warts characteristic of *L. irideum*.

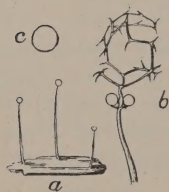


Fig. 25.
ECHINOSTELIUM MINUTUM de Bary.

a. Group of three sporangia. Magnified 20 times.

b. Sporangium showing capillitium; all the spores dispersed but two. Magnified 280 times.

c. Spore. Magnified 500 times.

GENUS 17. ECHINOSTELIUM de Bary.—

Sporangia stalked, minute, colourless. Capillitium branches few, arising from the apex of the short columella.

1. *E. minutum* de Bary.—Sporangia colourless, globose, 50 μ diam. Columella very short. Capillitium of two or three colourless zigzag threads, sparingly branched and anastomosing, and with free spine-like branchlets. Stalk setaceous, attenuated upwards, 0.5 mm. long, consisting of a hyaline membrane enclosing nearly colourless refuse matter. Spores colourless, smooth, 6 μ diam.

Hab. On dead wood. Resembling a species of *Mucor*, and apparently most nearly allied to *Clastoderma Debaryanum* Blytt.

ORDER II.—AMAUROCHÆTACEÆ.

GENUS 18. **AMAUROCHÆTE** Rostafinski. — *Æthalia* pulvinate composed of elongate confluent sporangia. Sporangium-walls not developed. Capillitium rising from the base in irregularly flattened strands, and dividing into many anastomosing branches.

1. **A. atra** Rost. — Plasmodium white. *Æthali*um 2 mm. to 4 cm. diam., black, covered with a silvery evanescent membrane. Capillitium black, often scanty. Spores dull purple, spinulose, 11 to 13 μ diam.

Hab. On fir wood.

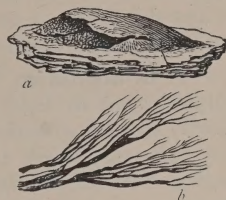


Fig. 26.
AMAUROCHÆTE ATRA Rost.

a. *Æthali*um. Half natural size.
b. Capillitium. Magnified 10 times.

GENUS 19. **BREFELDIA** Rostafinski. — *Æthalia* pulvinate, composed of subcylindrical, branched, and confluent sporangia. Capillitium of numerous horizontal threads, those of adjacent sporangia uniting on the boundary line and there forming chambered vesicles.

1. **B. maxima** Rost. — Plasmodium white. *Æthalia* sometimes many inches across, purplish brown. Capillitium brown. Spores purplish brown, minutely spinulose, 9 to 12 μ diam.

Hab. On dead wood.



Fig. 27.
BREFELDIA MAXIMA Rost.

a. *Æthali*um. Natural size.
b. Capillitium and spores. Magnified 50 times.

COHORT II.—LAMPROSPORALES.

SUBCOHORT I.—ANEMINEÆ.

ORDER I.—HETERODERMACEÆ.

GENUS 20. **LINDBLADIA** Fries. — Sporangia either combined to form an *æthali*um or closely compacted on a strongly developed hypothallus.

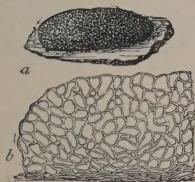


Fig. 28.
LINDBLADIA TUBULINA Fries.

a. *Æthali*um. Natural size.
b. Vertical section of *æthali*um. Magnified 6 times.

1. **L. tubulina** Fries. — *Æthalia* thin or pulvinate, consisting of confluent sporangia about 0.4 mm. diam., with persistent membranous walls; either black and rugose, with a cortex formed of imperfectly developed spores, or umber-brown with a surface of complete sporangia. Spores ochraceous-brown, nearly smooth, 4 to 6 μ diam.

Hab. On dead wood.

GENUS 21. **CRIBRARIA** Persoon.—Sporangia globose, stalked; sporangium-wall persistent and usually forming a cup in the lower half, continued above as a net of slender threads more or less thickened at the nodes, evanescent in the meshes. Spores nearly smooth.

1. **C. argillacea** Pers.—Plasmodium purple-brown or lead colour. Sporangia shortly stalked, sometimes sessile, crowded, clay-coloured, about 1 mm. diam.; sporangium-wall subpersistent throughout, cup imperfectly defined; net usually continued to the base, nodes scarcely thickened. Spores ochraceous, $5\ \mu$ diam.

Hab. On dead wood.

2. **C. rufescens** Pers.—Sporangium rufous-brown, about 0.6 mm. diam., with a cup one-third its height distantly toothed on the margin; net wide-meshed, threads firm, nodes scarcely thickened. Stalk as long as the sporangium, black. Spores pale yellowish red, $6\ \mu$ diam.

Hab. On dead fir wood.

3. **C. macrocarpa** Schrad.—Sporangia robust, 0.6 to 0.8 mm. diam., nut-brown; the cup marked with numerous longitudinal ribs and perforated towards the deeply toothed margin, which merges into an irregular net with branching nodes. Spores ochraceous, $5\ \mu$ diam.

Hab. On dead fir wood.

4. **C. aurantiaca** Schrad.—Plasmodium sap-green or lead colour. Sporangium nut-brown, about 0.5 mm. diam., with a cup one-third its height, deeply toothed on the margin; net with slender threads and flat, angular, branching nodes. Stalk twice to four times the length of the sporangium, dark brown. Spores ochraceous, $5\ \mu$ diam.

Hab. On dead wood, chiefly fir.

5. **C. intricata** Schrad.—Sporangium ochraceous-brown, 0.5 to 0.7 mm. diam., with a cup one-third its height, or wanting; the net close, delicate, regular; nodes numerous, small, prominent, often branched, dark brown, with many free rays. Stalk long, subulate. Spores ochraceous, $5\ \mu$ diam.

Hab. On dead wood.

6. **C. tenella** Schrad.—Differs from *C. intricata* in the nodes of the net being rounded and without free rays.

Hab. On dead wood.

7. **C. pyriformis** Schrad.—Sporangium brittle, 0.5 mm. diam., purplish brown, with a cup one-third its height; net with brownish yellow firm threads, and dark somewhat triangular nodes; these and

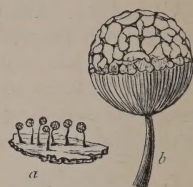


Fig. 29.
CRIBRARIA AURANTIACA
Schrad.

- a. Group of sporangia. Twice natural size.
b. Sporangium after dispersion of the spores. Magnified 20 times.

the yellowish sporangium-wall are densely beset with large purple-brown plasmodic granules, $2\ \mu$ diam. Stalk dark purple-brown. Spores pinkish-ochre, $5\ \mu$ diam.

Hab. On dead wood.

8. **C. violacea** Rex.—Sporangium minute, about $0\cdot2$ mm. diam., dark violet, on a long stalk; the membranous cup violet-blue, one to two-thirds the height of the sporangium; net of delicate threads connecting the broad, flat, angular nodes. Spores lilac, minutely warted, $7\ \mu$ diam.

Hab. On dead wood.

GENUS 22. **DICTYDIUM** Schrad.—Sporangium-wall with parallel ribs extending from the base to the apex, connected by slender transverse threads.

1. **D. umbilicatum** Schrad.—Plasmodium purple. Sporangia globose, becoming umbilicate above, $0\cdot5$ to $0\cdot7$ mm. diam., nodding, red purple; the ribs arising from the slender apex of the stalk. Spores pale red brown, 4 to $7\ \mu$ diam., with two or three purple plasmodic granules on the hemisphere.

Hab. On dead wood.

Var. **fusum** Lister (Journ. Bot. 1898, p. 120) differs from the type in being browner in colour, and having a definite cup from the margin of which the ribs arise.

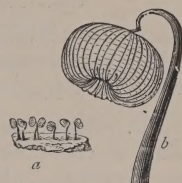


Fig. 30.

DICTYDIUM UMBILICATUM
Schrad.

- a. Group of sporangia. Twice natural size.
b. Sporangium after dispersion of the spores. Magnified 20 times.

ORDER II.—LICEACEÆ.

GENUS 23. **LICEA** Schrad.—Sporangia sessile. Sporangium-wall cartilaginous. Capillitium wanting.

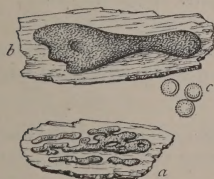


Fig. 31.

LICEA FLEXUOSA Pers.

- a. Group of plasmodiocarps. Twice natural size.
b. Plasmodiocarp. Magnified 6 times.
c. Spores. Magnified 200 times.

1. **L. flexuosa** Pers.—Plasmodium dull yellow or rosy. Plasmodiocarps elongate, often branching, dark brown. Spores pale olive-brown, spinulose, 11 to $14\ \mu$ diam.

Hab. On dead wood.

2. **L. pusilla** Schrad.—Sporangia hemispherical or pulvinate, about 1 mm. diam., dark brown, glossy, dehiscing by lobes. Spores olive-brown, smooth, 16 to $20\ \mu$ diam.

Hab. On dead wood. Scotland.

ORDER III.—TUBULINACEÆ.

GENUS 24. **TUBULINA** Persoon.—Sporangia tubular, compacted. Capillitium wanting.

1. **T. fragiformis** Pers. — Plasmodium rose or cream-coloured. Sporangia cylindrical, crowded on a spongy hypothallus, forming a rounded honeycomb-like rufous-brown mass. Spores pale rufous-brown, reticulate, 5 to 8 μ diam.

Hab. On dead wood.



Fig. 32.

TUBULINA FRAGIFORMIS Pers.

Cluster of sporangia. Magnified $2\frac{1}{2}$ times.

ORDER IV.—RETICULARIACEÆ.

GENUS 25. **DICTYDIÆTHALIUM** Rostafinski.—Æthelium flat, formed of erect columnar sporangia. Sporangium-wall incomplete, dome-shaped on the top, continued to the base in four to six straight threads.

1. **D. plumbeum** Rost.—Plasmodium rose-coloured. Æthelium dull slate or clay-coloured, minutely areolated with the convex apices of the sporangia, which are 0.2 mm. diam. Spores pale yellow, spinulose, 9 to 12 μ diam.

Hab. On dead wood.

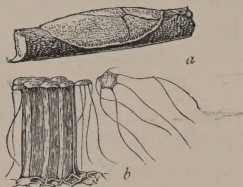


Fig. 33.

DICTYDIÆTHALIUM PLUMBEUM
Rost.

- a.* Æthelium. Natural size.
b. Eight sporangia of an æthelium isolated; in three the column of spores has fallen away, leaving the cap and persistent threads. Magnified 20 times.

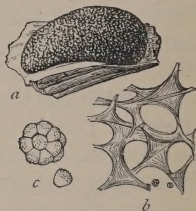


Fig. 34.

ENTERIDIUM OLIVACEUM Ehrenb.

- a.* Plasmodiocarp. Magnified twice.
b. Part of spurious capillitium. Magnified 35 times.
c. A spore cluster, and one isolated spore. Magnified 210 times.

GENUS 26. **ENTERIDIUM** Ehrenberg.—Æthelium composed of confluent interwoven sporangia, their internal walls perforated with large openings.

1. **E. olivaceum** Ehrenb.—Plasmodium rose-colour. Æthelium pulvinate, olive-brown, 1 to 3 cm. diam., but very variable in size; sporangium-walls yellow-olive. Spores in clusters of 6 to 20, sometimes free, pale olive, warted on one side, 9 to 12 μ diam.

Var. **liceoides** Lister (Journ. Bot. 1896, p. 211).—Sporangia forming long or net-like plasmodiocarps; the internal perforated sporangium-walls wanting or rudimentary.

GENUS 27. **RETICULARIA** Bulliard.
—*Æthalia* composed of interwoven sporangia; the persistent portion of their walls rusty brown, forming broad membranous folds and strands, dividing above into narrow threads.

1. **R. Lycoperdon** Bull.—Plasmodium cream-white. *Æthaliu* pulvinate, 2 to 8 cm. diam., at first enclosed by a silvery cortex. Spores pale rusty-brown, closely reticulate on one side, 6 to 8 μ diam.

Hab. On stumps. Common.

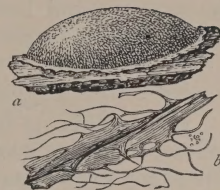


Fig. 35.

RETICULARIA LYCOPERDON
Bull.

a. *Æthaliu*. Natural size.

b. Fragment of capillitium. Magnified 100 times.

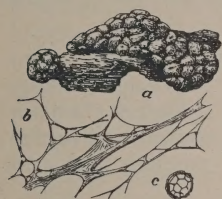


Fig. 36.

LICEOPSIS LOBATA Torrend.

a. Two groups of sporangia. Magnified $3\frac{1}{2}$ times.

b. Capillitium. Magnified 50 times.

c. Spore. Magnified 450 times.

GENUS 28. **LICEOPSIS** Torrend (in Bull. Soc. Nat. Portug. Sci. Nat., ii, fasc. i. p. 63, 1908). Sporangia subglobose, sessile, closely compacted, with fragile membranous walls. Capillitium when present consisting of slender branching threads and strands with membranous expansions at the axils.

1. **L. lobata** Torrend (*Reticularia lobata* Lister). Sporangia subglobose, often depressed, angled by mutual pressure, rarely solitary, rusty-brown, shining iridescent, about 0.5 mm. diam. Spores rusty brown, reticulate, 6 to 10 μ diam.

Hab. On stumps of fir and chestnut.

SUBCOHORT II.—CALONEMINEÆ.

ORDER I.—TRICHIACEÆ.

GENUS 29. **TRICHIA** Haller.—Sporangia stalked or sessile; elaters free, pointed at each end, thickened with two to five spiral bands.

* *Spores reticulate*

1. **T. favoginea** Pers. — Plasmodium white. Sporangia yellow, 0.6 to 0.7 mm. broad, ovoid, erect, crowded, sessile. Elaters 7 μ diam., with 5 spiral bands. Spores yellow, 13 to 15 μ diam., widely reticulate with deep narrow bands, giving a border about 2 μ wide.

Hab. On fir stumps.

2. **T. verrucosa** Berk. — Sporangia yellow, pyriform, stalked, 0.8 mm. broad, clustered. Stalks 0.2 to 0.7 mm. long, often combined, membranous. Elaters 5 μ diam.,

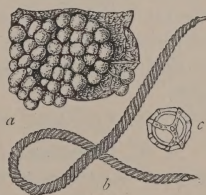


Fig. 37.

TRICHIA AFFINIS de Bary.

a. Group of sporangia. Twice natural size.

b. Elater. Magnified 250 times.

c. Spore. Magnified 400 times.

with 3 to 5 spiral bands. Spores 13 to 15 μ diam., reticulate with shallow narrow bands forming a network with about seven meshes to the hemisphere; border 1 μ wide.

Hab. On fir stumps.

3. **T. affinis** de Bary.—Plasmodium white. Sporangia yellow, globose, crowded, sessile, 0.6 to 1 mm. diam. Elaters 5 μ diam., with 4 to 5 spiral bands. Spores 13 to 15 μ diam., reticulated with shallow pitted bands forming a network with three or four meshes to the hemisphere, border 1 μ wide.

Hab. On stumps. Common.

4. **T. persimilis** Karst.—Plasmodium white. Sporangia yellow-brown, globose, crowded, sessile, 0.5 to 0.8 mm. diam. Elaters 4.5 μ diam., with 4 to 5 spiral bands, spinulose. Spores yellow-brown, 11 to 14 μ diam., with the reticulation broken into irregular shallow pitted warts; border interrupted.

Hab. On stumps. Common.

5. **T. scabra** Rost.—Plasmodium white. Sporangia orange-yellow, globose, crowded, sessile, 0.8 mm. diam. Elaters 5 μ diam., with 4 to 5 spiral bands which are often spinose, and rather irregular. Spores yellow, 10 μ diam., closely warted or minutely reticulate, without a border.

Hab. On stumps. Common.

** *Spores minutely warted or spinulose*

6. **T. varia** Pers.—Plasmodium white. Sporangia ochraceous, globose or turbinate, 0.8 mm. diam., crowded or scattered, sessile or on short dark stalks. Elaters 4 μ diam., with two spiral bands. Spores ochraceous, minutely warted, 13 μ diam.

Hab. On dead wood. Common.

7. **T. contorta** Rost. — Plasmodium watery white. Sporangia yellow-brown, subglobose or plasmodiocarps, about 0.6 mm. diam., crowded or scattered, sessile; sporangium-wall charged with brown granular matter. Elaters yellow or brown, 3 (rarely 5) μ diam., with four close, sometimes indistinct, spiral bands; the tips often swollen and ending in a curved point. Spores yellow, minutely warted, 12 μ diam.

Hab. On dead wood.

8. **T. lutescens** Lister (Journ. Bot. 1904, p. 136).—Sporangia globose, 0.2 to 0.7 mm. diam., sessile, bright chrome-yellow; sporangium-wall membranous, free from granular matter; elaters long, sometimes forked or very short, 3 to 4 μ diam., smooth with 3 to 4 faint spiral bands, the tips rounded or shortly tapering, spores yellow or with an olive tint, minutely warted, 10 to 12 μ diam.

Hab. On dead wood.

9. **T. erecta** Rex.—Sporangia dark brown, reticulate with broad yellow veins, which are free from granular deposits, turbinate,

stalked, scattered. Stalk dark brown, opaque. Elaters often very long, 4 μ diam., with four close spiral bands, spinulose. Spores yellow, minutely warted, 12 μ diam.

Hab. On dead wood.

This species is closely allied to *Hemitrichia intorta*.

10. **T. fallax** Pers.—Plasmodium rose-coloured or white. Sporangia turbinate, stalked, gregarious, shining olive, 0.8 mm. diam. Sporangium-wall translucent. Stalk hollow, filled to the base with spores. Elaters brown, tapering into long slender points; spiral bands 4 to 5. Spores yellow-brown, minutely warted, 9 to 12 μ diam.

Hab. On dead wood. Common.

11. **T. Botrytis** Pers.—Plasmodium purple-brown. Sporangia turbinate, stalked, gregarious, simple or combined in clusters, purplish brown, often reticulate with yellow veins, or black. Stalk dark brown, solid. Elaters brown, tapering into long slender points; spiral bands 3 to 5, prominent on the margin. Spores ochraceous, minutely spinulose, 9 to 11 μ diam.

Hab. On dead wood.

Var. **lateritia** Lister.—Elaters pale burnt-sienna, with shorter points. Spores orange-yellow.

Hab. On dead wood.

Var. **flavicomma** Lister.—Sporangia minute, solitary; elaters and spores bright yellow.

Hab. On dead leaves, usually holly.

Var. **munda** Lister (Journ. Bot. 1897, p. 216).—Elaters smooth, with neat regular spiral bands.

Hab. On dead leaves; rarely on rotten wood.

GENUS 30. **OLIGONEMA** Rostafinski.
—Sporangia minute, densely clustered, sessile. Elaters more or less scanty, spiral bands obscure.

1. **O. nitens** Rost.—Sporangia subglobose, 0.3 mm. diam., heaped together, shining, yellow. Elaters usually few, short, obtuse, sometimes longer and pointed; spiral markings faint or wanting. Spores 11 to 16 μ diam., yellow, reticulate, with a border 1 μ wide.

Hab. On dead wood.

2. **O. flavidum** Peck.—Sporangia ovoid, erect, 0.5 to 0.6 mm. diam., crowded or somewhat heaped. Elaters fairly abundant, long, or sometimes short, without distinct spiral bands, but marked with



Fig. 30.

OLIGONEMA NITENS Rost.

- a. Cluster of sporangia. Magnified 3 times.
b. Elater. Magnified 280 times.
c. Spore. Magnified 400 times.

close irregular lines of minute warts. Spores 12 to 13 μ diam., regularly reticulate with narrow bands.

Hab. On dead wood and moss.

GENUS 31. **HEMITRICHIA** Rostafinski.—Sporangia stalked or sessile; capillitium an elastic network of branching threads thickened with spiral bands.

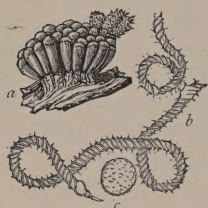


Fig. 39.

HEMITRICHIA RUBIFORMIS
Lister.

- a. Cluster of sporangia. Magnified 2½ times.
b. Capillitium. Magnified 280 times.
c. Spore. Magnified 400 times.

1. **H. rubiformis** Lister. — Plasmodium purple-red. Sporangia subcylindrical, about 0.6 mm. broad, crowded, or in clusters of 6 to 12, with wrinkled membranous red-brown or olive-black stalks not containing spores. Capillitium-threads orange-red, with 3 to 5 regular spiral bands, strongly spinose. Spores pale orange-red, minutely warted, 10 μ diam.

Hab. On dead wood.

2. **H. intorta** Lister. — Sporangia turbinate, 0.5 mm. broad, scattered, bright yellow, on short, dark, solid stalks. Capillitium-threads orange-yellow, twisted, spinulose, with 4 or 5 close, more or less distinct, spiral bands. Spores yellow, minutely warted, 10 μ diam.

Var. **leiotricha** Lister. — Sporangia olive-yellow. Spirals on elaters less distinct or nearly wanting. Spores 12 to 13 μ diam.

Hab. On dead wood and leaves.

3. **H. clavata** Rost. — Plasmodium white. Sporangia turbinate, 0.7 mm. broad, stalked, shining, ochraceous-yellow. Stalk cylindrical, dark, hollow, filled with spores. Capillitium-threads yellowish olive, with 5 or 6 well-defined bands arranged in an elongated spiral. Spores ochraceous, minutely warted, 8 to 10 μ diam.

Hab. On dead wood.

4. **H. Karstenii** Lister. — Sporangia curved or branched brown or ochraceous plasmodiocarps, or globose. Except that the capillitium-threads are combined into a network, this species agrees with *Trichia contorta*.

Hab. On dead wood.

5. **H. Serpula** Rost. — Plasmodiocarps, 0.5 mm. broad, winding or forming a net, golden yellow. Capillitium-threads yellow, with 3 to 5 well-marked spiral bands, strongly spinose. Spores yellow, 10 to 12 μ diam., reticulate with narrow bands, giving a border 1 μ diam.

Hab. On dead wood.

6. **H. chrysospora** Lister. — Sporangia subglobose, 0.7 mm. diam., sessile, crowded, bright yellow. Capillitium-threads yellow, with 4 or 5 close spiral bands. Spores yellow, 14 to 18 μ diam.,

neatly reticulated with deep narrow bands, giving a border 1 or 2 μ wide.

Hab. On fallen larch. Rare.

A form occurs with free elaters.

ORDER II.—ARCYRIACEÆ.

GENUS 32. **ARCYRIA** Wiggers.—Sporangia stalked; sporangium wall persistent below as a membranous cup; stalks filled with spores or spore-like cells; capillitium forming an elastic network.

1. **A. ferruginea** Sauter.—Plasmodium rose or cream-coloured. Sporangia turbinate, about 0·7 mm. broad, crowded, orange-red, rarely ochraceous; the cup reticulated with smooth round-meshed thickenings. Capillitium-threads free from the cup, subtriangular in section, thickened with transverse bands and spines on one side, with broken reticulation on the other. Spores ochraceous, minutely warted, 9 to 11 μ diam.

Hab. On dead wood. Distinguished by its large spores.

2. **A. albida** Pers.—Plasmodium white. Sporangia ovoid, pale grey or yellowish, variable in size. Capillitium attached to the cup; threads minutely and closely warted, or spinulose, the lower threads usually smooth. Spores nearly smooth, 6 to 7 μ diam.

Hab. On dead wood and leaves. Common.

3. **A. pomiformis** Rost.—Sporangia scattered, subglobose, yellow. Capillitium beset with spines arranged in an open spiral. Spores as in *A. albida*, to which this species is closely allied.

Hab. On dead wood.

4. **A. punicea** Pers.—Plasmodium white. Sporangia ellipsoid or conico-cylindrical, about 0·9 mm. broad, crimson, gregarious. Stalks 0·5 to 1 mm. long. Capillitium attached to the cup; threads without free ends, thickened with half-rings, cogs or spines arranged in a loose spiral. Spores nearly smooth, 7 μ diam.

Hab. On rotten wood. Common.

5. **A. incarnata** Pers.—Plasmodium white. Sporangia shortly cylindrical, 0·6 mm. broad, flesh-colour, crowded. Stalks short. Capillitium free from the cup; the threads often forming rings, with few or many free spinose clavate ends; the thickenings as in *A. punicea*, but usually more spinulose. Spores nearly smooth, 7 μ diam.

Hab. On dead wood and sticks. Common.

6. **A. stipata** Lister.—Sporangia shortly cylindrical, 0·6 to 0·9 mm. broad, copper colour. Capillitium an elastic network

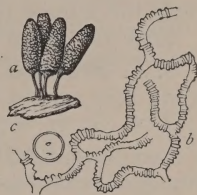


Fig. 40.

ARCYRIA PUNICEA Pers.

a. Group of sporangia. Twice natural size.

b. Capillitium. Magnified 250 times.

c. Spore. Magnified 560 times.

resembling that of *A. punicea* except in the threads being marked with 2 or 3 spiral bands in addition to the cogs and half-rings. Spores nearly smooth, $7\ \mu$ diam.

Hab. On dead wood. Surrey.

7. *A. flava* Pers.—Plasmodium white. Sporangia cylindrical, about $0\cdot4$ mm. broad, ochraceous, crowded. Capillitium free from the cup, expanding into a drooping column many times the length of the sporangium; threads beset with sharp spines and half-rings, arranged in a loose spiral. Spores nearly smooth, $7\ \mu$ diam.

Hab. On rotten wood.

8. *A. Ærstedtii* Rost.—Differs from *A. flava* in being dull crimson in colour, and in the slender threads being more evenly spinulose.

Hab. On fir wood.

GENUS 33. **LACHNOBOLUS** Fries.—Sporangia sessile, clustered. Capillitium a loose network of threads attached to many parts of the single-layered persistent sporangium-wall.

1. *L. circinans* Fries.—Sporangia subglobose, shining ochraceous-brown; sporangium-wall membranous, firm, papillose. Capillitium of freely branching ochraceous-yellow threads, closely and equally beset with prominent warts. Spores pale yellow, almost smooth, 6 to $8\ \mu$ diam.

Hab. On dead wood.

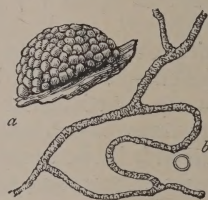


Fig. 41.

LACHNOBOLUS *CIRCINANS* Fries.

a. Cluster of sporangia. Twice natural size.

b. Capillitium and spore. Magnified 300 times.

GENUS 34. **PERICHÆNA** Fries.—Sporangium-wall of two layers, the outer thickened with dark granules which are exceptionally absent in the upper part. Capillitium of slender branching threads minutely warted or spinose.

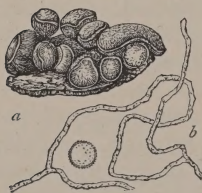


Fig. 42.

PERICHÆNA *POPULINA* Fries.

a. Group of sporangia. Magnified 7 times.

b. Capillitium and spore. Magnified 280 times.

the thread. Spores bright yellow in mass, nearly smooth, 9 to $10\ \mu$ diam.

Hab. On bark.

2. *P. depressa* Libert.—Sporangia flat, polygonal, crowded, brown, dehiscing by a well-defined lid; outer layer of the spor-

1. *P. chrysosperma* Lister.—Plasmodium pale brown. Sporangia curved or ring-shaped plasmodiocarps, sometimes subglobose, rarely stalked, brown; sporangium-wall subcartilaginous, with external granular deposits. Capillitium profuse, bright yellow, of sparingly branched threads beset with numerous straight or curved spines as long as the diameter of

angium-wall cartilaginous, inner membranous. Capillitium a web of branching slender yellow threads, $2\ \mu$ diam., minutely warted and with irregular constrictions. Spores yellow, nearly smooth, about $10\ \mu$ diam.

Hab. On bark.

3. **P. populina** Fries.—Plasmodium watery white. Sporangia subglobose or depressed, crowded, purple-brown or grey, dehiscing by a well-defined lid. Capillitium usually scanty, sometimes reduced to only a few simple or branched free threads. Essentially distinguished from *P. depressa* by the larger spores measuring about $13\ \mu$ diam.

Hab. On bark.

4. **P. variabilis** Rost.—Sporangia curved or netlike plasmodiocarps, sometimes globose, $0.5\ \text{mm.}$ diam., scattered, dull yellow or umber; outer layer of sporangium-wall more or less charged with dark angular granules, and closely combined with the membranous, minutely papillose inner layer. Capillitium a profuse web of yellow threads, rough with minute warts and with irregular constrictions. Spores yellow, nearly smooth, 10 to $13\ \mu$ diam.

Hab. On dead leaves and wood.

Var. **pedata** Lister.—Sporangia stalked.

ORDER III.—MARGARITACEÆ.

GENUS 35. **MARGARITA** Lister.—Sporangia globose, with a translucent wall. Capillitium a profuse coil of slender, hair-like, scarcely branching threads.

1. **M. metallica** Lister.—Plasmodium watery white. Sporangia mostly solitary, about $0.7\ \text{mm.}$ diam., pearl-grey or copper colour, iridescent. Capillitium of very long grey threads about $1\ \mu$ broad. Spores almost colourless, nearly smooth, 10 to $11\ \mu$ diam.

Hab. On dead leaves, twigs and rotten planks.

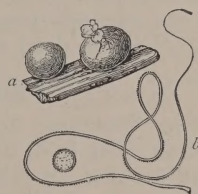


Fig. 43.

MARGARITA METALLICA Lister.
a. Two sporangia. Magnified 6 times.

b. Part of a long capillitium-thread, and a spore. Magnified 250 times.

GENUS 36. **DIANEMA** Rex.—Sporangia sessile; sporangium-wall membranous. Capillitium consisting of nearly straight threads, slender at both ends, attached above and below to the sporangium-wall.

1. **D. Harveyi** Rex.—Sporangia pulvinate or curved plasmo-

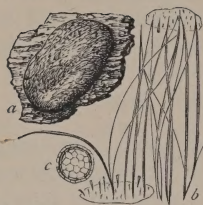


Fig. 44.

DIANEMA DEPRESSUM Lister.

- a. Plasmodiocarp. Magnified twice.
 b. Capillitium attached above and below to the walls of the sporangium. Magnified 50 times.
 c. Spore. Magnified 560 times.

diocarps, 1 mm. diam., dull red or bronze. Capillitium-threads erect, simple except at the ends, where they are attached by several short branches to the sporangium-wall. Spores pale yellowish, ochraceous or brick-red in mass, nearly smooth, 8 to 10 μ diam.

Hab. On dead wood.

2. *D. depressum* Lister.—Plasmodium white or rosy. Sporangia pulvinate, depressed, 2 to 5 mm. wide, at first shining violet, maturing to grey-brown. Capillitium-threads slender, rigid, forking and uniting above and below, where they are attached to the sporangium-wall by

suddenly acuminate ends. Spores yellowish-grey, delicately reticulate, 6 to 8 μ diam.

Hab. On dead wood.

3. *D. corticatum* Lister.—Plasmodium pink. Sporangia simple or net-like plasmodiocarps, 3 to 12 mm. long, glossy brown. Sporangium-wall of two layers, the outer cartilaginous, olivaceous, the inner hyaline. Capillitium of simple or acutely branching, slender, brown or pale threads, 0.5 to 1.5 μ diam., smooth or with beadlike thickenings, and sometimes with a prominent spiral band, or rarely with three spirals for a short distance. Spores nearly colourless, brownish pink in mass, subellipsoid, 11 $\times$ 9 μ diam., minutely warted on one side, adhering in clusters of 4 to 6.

Hab. On dead wood. Rhynie, Aberdeenshire.

GENUS 37. **PROTOTRICHIA** Rostafinski.—Sporangia globose. Capillitium-threads rising from the base of the sporangium as stout strands marked with spiral thickenings, dividing at length into a pencil of slender branches attached at the tips to the upper parts of the sporangium-wall.

1. *P. flagellifera* Rost.—Plasmodium white. Sporangia about 0.7 mm. diam., sessile, crowded or scattered, rarely stalked, pinkish brown or copper-colour, shining. Capillitium pale olive or brown. Spores pale brownish pink in mass, nearly smooth, 10 to 11 μ diam.

Hab. On dead sticks.



Fig. 45.

PROTOTRICHIA FLAGELLIFERA Rost.

- a. Group of sporangia. Magnified 4 times.
 b. Capillitium attached above to a fragment of the sporangium-wall, and a spore. Magnified 280 times.

ORDER IV.—LYCOGALACEÆ.

The order *Lycogalaceæ* is here retained among the *Calonemineæ* for convenience of classification, and that the sequence of species may correspond with the exhibition case in the British Museum. More correctly it should be placed with the *Anemineæ*, since the so-called "capillitium tubes" are formed between the component sporangia of the æthaliium, and are therefore of the nature of imperfect sporangium-walls.

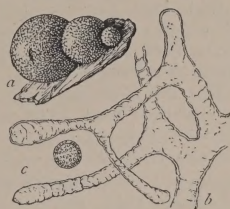


Fig. 46.

LYCOGALA MINIATUM Pers.

- a. Three æthalia. Natural size.
 b. Capillitium. Magnified 150 times.
 c. Spore. Magnified 600 times.

GENUS 38. **LYCOGALA** Adanson.—

Æthalia subglobose, with a cortex consisting of two or more closely combined layers, and provided with cell-like vesicles. Capillitium-tubes thick-walled where they traverse the cortex; thin-walled amongst the spores. Spores in mass pale pinkish grey.

1. **L. flavofuscum** Rost. — Plasmodium white. Æthalia subpyriform, 2 to 5 cm. diam., pale brown, smooth, minutely areolate and mottled; the cortex thick, of three layers, the middle one consisting of an aggregation of yellow vesicles. Capillitium branched and anastomosing. Spores minutely reticulate, 5 to 6 μ diam.

Hab. On dead wood.

2. **L. miniatum** Pers. — Plasmodium coral-red. Æthalia subglobose, from 2 mm. to 1 cm. diam., crowded or scattered, at first rose-red, maturing to pale yellowish brown, minutely warted; cortex with the vesicles arranged superficially. Spores minutely reticulate, 5 to 7 μ diam.

Hab. On dead wood. Common.

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var. microspora 32.

Crateriachea mutabilis 21

CRATERIUM Trent. (fig. 14).
leucocephalum Ditm. 24.
mutabile Fr. 24.
pedunculatum Trent. 23.

CRIBRARIA Pers. (fig. 29).
argillacea Pers. 36.
aurantiaca Schrad. 36.
intricata Schrad. 36.
macrocarpa Schrad. 36.
pyriformis Schrad. 36.
rufescens Pers. 36.
tenella Schrad. 36.
violacea Rex 37.

DIACHÆA Fr. (fig. 17).
elegans Fr. 27.
subsessilis Peck 27.

DIANEMA Rex (fig. 44).
corticatum Lister 46.
depressum Lister 46.
Harveyi Rex 45.

DICTYDIÆTHALIUM Rost. (fig. 33).
plumbeum Rost. 38.

DICTYDIUM Schrad. (fig. 30).
umbilicatum Schrad. 37.
var. fuscum 37.

DIDYMIUM Schrad. (figs. 1, 3, 18).
anellus Morgan 29.
Clavus Rost. 28.
crustaceum Fr. 29.
difforme Duby 27.
var. comatum 27.
dubium Rost. 28.
effusum Link 28.
farinaceum Schrad. 28.
var. minus 28.
nigripes Fr. 28.
var. xanthopus 28.
Serpula Fr. 28.
Trochus Lister 27.

ECHINOSTELIUM de Bary (fig. 25).
minutum de Bary 34.

ENERTHENEMA Bowm. (fig. 23).
elegans Bowm. 33.

ENTERIDIUM Ehrenb. (fig. 34).
olivaceum Ehrenb. 38.
var. liceoides 38.

- FULIGO Haller (fig. 12).
 ellipsospora Lister 23.
 muscorum Alb. & Schw. 23.
ochracea Peck 23.
 septica Gmel. 22.
- HEMITRICHIA Rost. (fig. 39).
 chrysospora Lister 42.
 clavata Rost. 42.
 intorta Lister 42.
 var. *leiotricha* 42.
 Karstenii Lister 42.
 rubiformis Lister 42.
 Serpula Rost. 42.
- LACHNOBOLUS Fr. (fig. 41).
 circinans Fr. 44.
- LAMPRODERMA Rost. (fig. 24).
 arcyronema Rost. 34.
 echinulatum Rost. 33.
 irideum Mass. 34.
 physaroides Rost. 33.
 violaceum Rost. 34.
 var. *Carestiæ* 34.
 var. *Sauteri* 34.
- LEOCARPUS Link (fig. 15).
 vernicosus Link 24.
- LEPIDODERMA de Bary (fig. 20).
 Carestianum Rost. f. *Chailletii* 30.
 tigrinum Rost. 29.
- LICEA Schrad. (fig. 31).
 flexuosa Pers. 37.
 pusilla Schrad. 37.
- LICEOPSIS Torrend 39 (fig. 36).
 lobata Torrend 39.
- LINDBLADIA Fr. (fig. 28).
 Tubulina Fr. 35.
- LYCOGALA Adanson (fig. 46).
 flavo-fuscum Rost. 47.
 miniatum Pers. 47.
- MARGARITA Lister (fig. 43).
 metallica Lister 45.
- OLIGONEMA Rost. (fig. 38).
 flavidum Peck 41.
 nitens Rost. 41.
- PERICHÆNA Fr. (fig. 42).
 chrysosperma Lister 44.
 depressa Lib. 44.
 populina Fr. 45.
 variabilis Rost. 45.
 var. *pedata* 45.
- PHYSARUM Pers. (fig. 11).
 Berkeleyi Rost. 20.
 bivalve Pers. 22.
 calidris Lister 19.
 cinereum Pers. 21.
 citrinum Schum. 20.
- PHYSARUM (continued)—
 compressum Alb. & Schw. 21.
 conglomeratum Rost. 22.
 contextum Pers. 22.
 Crateriachea Lister 21.
 Diderma Rost. 22.
 didermoides Rost. 21.
 var. *lividum* 21.
 leucopus Link 19.
 murinum Lister 19.
 nutans Pers. 20.
 var. *leucophæum* 20.
 penetrale Rex 20.
 psittacinum Ditm. 20.
 straminipes Lister 21.
 vernum Somm. 21.
 virescens Ditm. 22.
 var. *nitens* & var. *obscurum* 22.
 viride Pers. 20.
- PROTOTRICHIA Rost. (fig. 45).
 flagellifera Rost. 46.
- Raciborskia elegans* Berl. 31.
- RETICULARIA Bull. (fig. 35).
 lobata Lister 39.
 Lycoperdon Bull. 39.
- SPUMARIA Pers. (fig. 19).
 alba DC. 29.
 var. *dictyospora* 29.
- STEMONITIS Gled. (fig. 21).
 ferruginea Ehrenb. 31.
 flavogenita Jahn 31.
 fusca Roth 30.
 var. *confluens* 30.
 var. *flaccida* 30.
 herbatica Peck 31.
Smithii Macbr. 31.
 splendens Rost. 30.
 var. *confluens* 31.
 var. *flaccida* 31.
 var. *Webberi* 30.
- TRICHIA Haller (fig. 37).
 affinis de Bary 40.
 Botrytis Pers. 41.
 var. *flavicomma* 41.
 var. *lateritia* 41.
 var. *munda* 41.
 contorta Rost. 40.
 erecta Rex 40.
 fallax Pers. 41.
 favoginea Pers. 39.
 lutescens Lister 40.
 persimilis Karst. 40.
 scabra Rost. 40.
 varia Pers. 40.
 verrucosa Berk. 39.
- TUBULINA Pers. (fig. 32).
 fragiformis Pers. 38.

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